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Educational Sales Methods and Merchandising of Ranges

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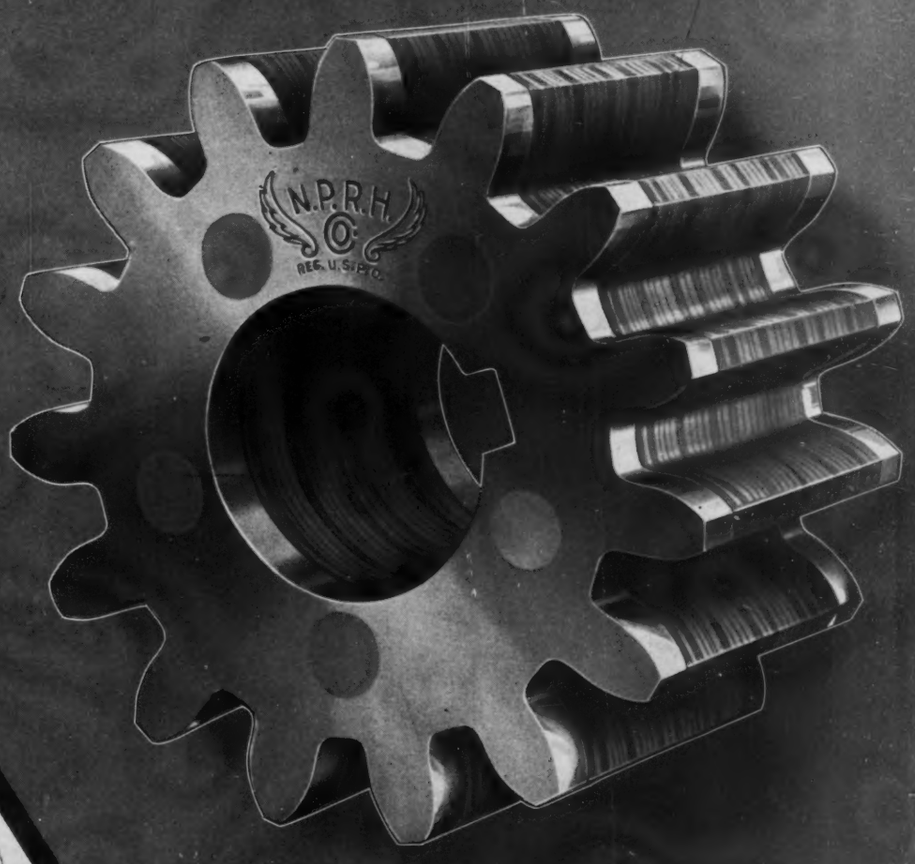

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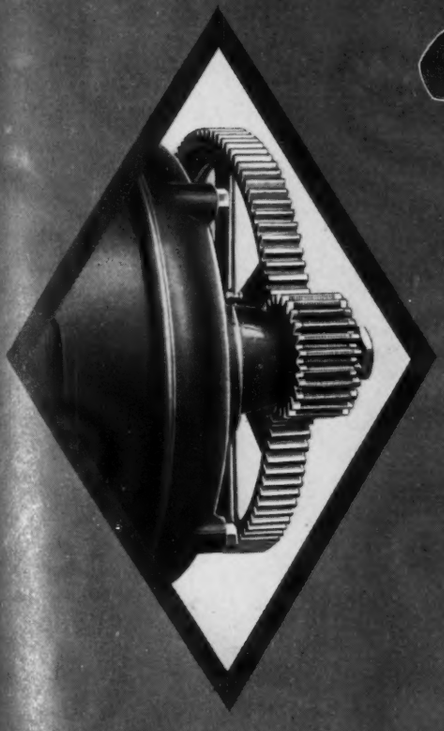

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Electrical World

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Unwelcome Shortage of Power

POWER shortage is an unusual, unwelcome and unbidden characteristic in central station operation. But in wartime, as in the farmer's dry spell, all signs fail. And in the electrical industry, as in other industries which are now speeding at top notch, consumption is racing past production, demand is exceeding supply. We have material shortage, fuel shortage, labor shortage, food shortage. Power shortage is in some communities an inescapable corollary of the others. That shortage of power makes its uninviting appearance is not strange; what is remarkable is that it has not arisen before as a more serious factor.

On top of stimulation to industries by internal prosperity and by war orders from the first Allies to accept the challenge of the German government came the entrance of our own country into the conflict. Still greater stimulation of industries connected with war was offset slightly by reduced activity on the part of luxury business. The net result was that not less power but more power was needed. The corner merchant in the same predicament can enlarge his stocks; he can move his capital more quickly. The hotel can double men in rooms and "regret" that the convention and absence of other quarters make this inconvenience necessary. But there are no straphangers for the central station.

The electrical utility is to-day wearing out its power station equipment at an excessively rapid rate because it is requiring of that equipment more work than it was designed and constructed to do. It is consuming its capital in this process. By forcing generating and boiler room equipment it is giving more in quantity of the service which the public wants, but it is depreciating property at a high rate. It cannot afford to go too far in this direction.

That the generating companies have placed orders far ahead the manufacturers offer unassailable proof. In some lines orders are on the books for delivery three years hence. This is not so simple a matter as it sounds. To order far ahead when prices are at the present high level may mean that the investment will have to be roughly twice as much as it would have amounted to for the same unit a few years ago. Would a shoe dealer order even part of his 1920 stock at prevailing prices? Yet the implied condition upon which the electrical utility progresses is that it shall be ready to meet the demands made upon it under ordinary conditions. It has to buy ahead. If the overbought condition of the market forces it to buy far ahead, it buys for delivery a long time in the future, paying the increased price due to world-wide demand and world-wide shortage.

To discourage new business goes against the grain. It is not what we have done in the past. But when the alternative is to neglect old customers, the right answer is plain, unless, of course, the new business is a question of national defense. The first problem, however, is to make the shortage felt as little as possible, to keep it from being felt at all in industries vital to the national safety. All the other problems sink into insignificance compared with that. The first aim is to render the service; the question of how it is to be done is incidental to the main issue. Many studies are under way to increase unit productiveness of both men and material; and under the stress of present issues it is to be expected that more rigid conservation policies will be introduced. The companies will respond to the public need, although the sacrifice of non-essential uses of energy may be asked of the public as its share.

A Unique Lighting System

ANY one who has visited the Nela Park Laboratory recently has come away with a vivid and most interesting impression of the possibilities of daylight lighting. To those not familiar with the locality it may be mentioned that the works are on the top of a rather steep bluff to which the approaches are long and circuitous and exposed in winter to weather conditions that make access difficult and uncomfortable. For the convenience and comfort of the employees the difficulty was removed by constructing from the base of the rise to near its top a passage 100 yards (91.4 m.) long and rising by successive ramps and short flights of steps about 35 feet (10.6 m.). Once near the top of the bluff the way to the various buildings becomes easy and the passage does the rest.

How to light a long underground tunnel of this sort was a serious problem. Of course ordinary ceiling fixtures might have been used, but the effect is not altogether pleasant, and it was thought worth while to try an experiment with the object of giving the passage conditions of lighting as near daylight as the state of the art would permit. To this end the main passage was provided with narrow lateral air spaces reaching to the full height of the passage between the outer concrete walls and the inner walls of hollow tile. These air spaces are good in themselves as lessening the unpleasant likelihood of dampness, and are also made to serve the source of what is perhaps the best approximation of daylight lighting effect that has yet been obtained. In the inner walls of the passage were constructed thirty-two windows on each side, glazed with a rather light translucent glass transmitting light freely but preventing view of the walls outside. Just above

each of these windows was installed a 100-watt blue-glass daylight lamp in a show-window lighting reflector, so as to throw a large proportion of the light through the windows. There is in addition a smaller emergency lighting circuit with special provisions for certainty of service which are described elsewhere in our columns. The actual result is very pleasing. The passage does not convey at all the impression of being an underground tunnel, but might well be merely a covered way connecting two buildings and lighted from the sky itself. It is equally successful from the ordinary standpoint of artificial lighting, and is certainly as admirable an example of resourcefulness in meeting a somewhat difficult problem in illuminating engineering as has come to our notice.

Central Station Laboratories

THE modern city central lighting and power station has to maintain its volt, ampere and watt standards to a degree of precision which twenty years ago was regarded as the sole prerogative of the scientific laboratories of the country. The voltmeter, ammeter and wattmeter standards have to be checked and kept in reliable condition at the station, in such a manner that the portable working instruments may be recalibrated at regular intervals, by comparison therewith. In order that watt-hour meters on customers' premises can be tested in place, with satisfactory precision, a considerably higher degree of precision has to be maintained in the standard instruments at the station than in the instruments on consumers' premises.

E. P. Peck contributes a description in this week's issue of a central station laboratory in Atlanta, Ga. The description is interesting in its indication of the details through which the standardization is effected. The fundamental standard is the Weston cadmium cell. Potentiometers enable various emfs. to be measured, in terms of the known voltages of these cells, over a very wide range. All standard voltmeter and ammeter readings are checked through the potentiometers, and finally the working instruments are calibrated against the standard instruments.

The circuit arrangements in such a laboratory are conveniently systematized to a high degree, so that any particular instrument goes to its own particular table for test and is connected, through its own particular switches, in a perfectly definite way. This systematization saves a large amount of time and labor. In this respect it is just the reverse of what an experimental laboratory has to be, where, in the nature of things, nearly everything is special and directed to a new particular result. Between the purely experimental laboratory, with its absence of routine, on the one hand, and the purely standardizing central station laboratory, with its precision of routine detail, on the other hand, there are all kinds of intermediate types of electrical testing laboratories, of mixed experimental and routine equipment, depending on the particular class of work to be done. There is room for more installations of the kind described in the central stations of the country.

Booming the Electric Range

AT THE present time central stations are somewhat divided on the question of the advisability of pushing electric cooking. Some regard it as the coming great field for added load; others think it a highly desirable addition to service in normal times but of questionable value at the present costs of material and labor, inasmuch as to succeed in a cooking campaign a very low figure must be quoted. Again, it is undoubtedly the fact that the effect of electric cooking appliances on the load curve of the station varies very widely from place to place. In England, for example, where the business was vigorously pushed before the war, the cooking load ran entirely clear of the general peak. The demand from the electric ranges as caused by the habits of the London population came subsequent to the main peak at all times when the peak was of any consequence. On the other hand, in some of our Southwestern territory, where the commercial power and lighting loads are a less important part of the load than in the East, it is found that the cooking demand falls ahead of the main peak far enough to keep it out of the way. In certain other places there is a perceptible tendency to pile the cooking load upon the general service at a disadvantageous time. Each central station must study the habits of its own community to judge correctly of the probable effect of a considerable cooking load. That upon the whole it is a desirable addition to the service, and likely in the future to be a profitable one, seems now quite certain; but it has limitations which need study.

Until recently the cost of electric ranges was absurdly high. The designers seemed to be victims of an obsession that electric ranges must in their whole material aspects resemble coal and gas ranges, while in truth electrical cooking apparatus must, for efficient working, be designed for its own purpose and not in imitation of old-fashioned devices. When carefully and intelligently handled electric cooking is wonderfully clean and economical. It can beat out coal at anywhere near present prices over a great part of the country, and as a practical proposition it can generally beat out gas if electrical energy is sold at figures now becoming common. It is to-day possible to put in an electric cooking outfit at a figure substantially the same as the cost of a correspondingly complete and adequate coal or gas outfit. By cooking outfit we do not here mean an elaborate and expensive electric range, made in imitation of the towering and elaborately filigreed coal ranges in fashion a few years ago, but an equipment fully able to meet the cooking requirements of the family, be it large or small.

The main thing in successful utilization of electrical energy for cooking is proper instruction in its uses, and it is just regarding this point that an article we publish this week on the cooking campaign in St. Louis becomes singularly pertinent. It has been found there, as elsewhere, that apartment-house business is of great importance. This is due to the fact that the families are generally small and of various habits, so that the

diversity factor is particularly favorable, much more favorable than it would be in a staid suburban neighborhood where comparatively little entertaining is done and everybody dines at approximately the same hour. The necessary initial investment per family is likely to be smaller in an apartment house and the use of electric appliances is likely to receive a little better personal attention that it would on a large estate. But for electric cooking on a large or small scale a small amount of practical instruction is necessary to secure proper economy. It is no more difficult than cooking with a gas or coal range—in fact, rather easier—but the apparatus must be handled in its own way and not precisely in the same way as other sources of heat. In other words, a little instruction means a considerable increase in the efficiency attained, without calling for the slightest degree of technical knowledge of electricity, but only for an entirely empirical familiarity with the things to be done.

The St. Louis company therefore started in, after a brief experience, on a deliberate educational campaign. The electric company not only furnished an adequate force of demonstrators but also undertook a course of ten lectures with demonstrations on electric cooking. It even went a step further and advertised a cash payment of $7.50 to each applicant who actually did attend all the ten lectures. The result was more than 1500 applications, which eventually simmered down to a group of over 400 who carried through the course. The effect on business was certainly electrical, aside from good immediate results. It soon became apparent that first-class modern apartments should be equipped with electrical kitchens, and the final result of the campaign was the sale of more than a thousand ranges, with half as many more likely to go in at a very early date.

What has been done in St. Louis can readily be done elsewhere, and there is a fine field for activity both in large and small companies. Aside from the positive economies that can be worked at the present cost of fuel, there is a possibility of a large business in summer resorts at remunerative prices. The summer cooking problem is a serious one, coal being often very expensive, wood inconvenient and troublesome, gas unattainable, and oil ranges a not inconsiderable fire risk. There never was a time more favorable for pushing the cooking load ahead.

Slip-Measuring Devices

IN ATTEMPTING to measure the slip of an induction motor it is necessary to observe the speed of rotation with great care, and also to observe with precision the frequency of the alternating-current supply circuit. When the slip is small these two observed quantities are nearly alike, and in subtracting one from the other to obtain the slip slight errors in either may involve large errors in the result. In fact, it is not rare to make careful observations in this way, and to find that, owing to some trifling and temporary irregularity, the speed of the induction motor comes out slightly greater than the synchronous speed of the circuit, thus making the slip appear negative, or as though the motor were a generator.

In order to avoid measuring the slip through the difference in two nearly equal speeds, various methods have been used for measuring it directly. Among these are stroboscopic methods, whereby the number of slipped revolutions may be made visible and capable of being counted in a given time.

This week's article by Milton M. Flanders describes a form of electromagnetic slip counter that is capable of being applied in succession to a number of different machines. A rotating contact on the induction-motor shaft is connected to a polarized relay, through the secondary of a potential transformer across the supply mains. The relay adjustment is such that it responds once in each slip cycle. The relay, beating slip cycles, is then connected with a clockwork-driven indicator dial, so that the needle of the dial advances one step for each slip cycle. A stop watch used with this instrument then enables the total number of slip cycles per minute to be measured with the ordinary degree of stop-watch revolution-indicator precision. When the measurement is made, the observer sees the slip cycles counted off on the dial and is able to assure himself that, by their regularity, the instrument is behaving properly.

Electromagnetic slip in an induction machine is a silent and stealthily elusive phenomenon, in which a mechanical rotor lags behind a rotating magnetic field in the stator. A slip-revolution counter of this kind translates it into visible beats and audible clicks, that restore the phenomenon to the realm of mechanically revealed quantities.

The Coming Issues

WHAT has the electrical industry done to help the government successfully to wage the war? What part is it now playing in the general war scheme? Its untiring activity in patriotic devotion to the nation's interests will be the theme of the next issue of the ELECTRICAL WORLD—the National Service Number. How many millions of dollars of Liberty bonds were taken up by the industry, both employer and employee? How many millions were subscribed to the Red Cross? To what extent have those engaged in the electrical profession found their way into the nation's fighting forces? These statistics have been carefully gathered for presentation in the coming issue. How the manufacturers have cooperated to furnish the government with electrical materials at the lowest prices, with quick deliveries, without disrupting the industry; how the best engineering minds of the industry are being used in national service, how the contractors and central stations have helped, will also be told. In addition to presenting information about the tangible operations of the industry in the war program, there will be articles that reflect how the industry has been able to maintain a service of such supreme quality in the face of mounting costs, decreasing labor and necessity for quick action. Reports will be made on methods for obtaining economies in many directions, such as produced by fuel consumption, material utilization and interconnection of systems. In general, the National Service Number will be a record of the spirit which pervades the industry when a national crisis arises—the first to act without stint of money, labor or brains.

Features of Modern Standardizing Laboratory

The Latest Ideas for Carrying Out Varied Work with High Accuracy Are Embodied in the New Laboratory Belonging to the Georgia Railway & Power Company

BY E. P. PECK

Superintendent of Operation Georgia Railway & Power Company, Atlanta, Ga.

THE standardizing laboratory of the Georgia Railway & Power Company has recently been moved into new quarters, and advantage was taken of this to devise a flexible and convenient arrangement of benches and wiring so that a varied line of work of high accuracy might be done with speed and a minimum of trouble.

The standardizing laboratory maintains the company's precision instruments, which are called the primary standards, and makes checks and does repair work on all of the portable instruments used by the various departments. As the accuracy of all of the company's watt-hour meters is dependent on the accuracy of the portable instruments, the greatest attention is paid to the maintenance of these portable standards. It is not only a question of maintaining their accuracy for the purpose of having the bills accurate, but it is a point of pride with the company that the tests cannot be successfully disputed.

All of the portable instruments which are used on important work are checked against one of the potentiometers. These instruments, as shown in Fig. 1, are mounted on a concrete-top table in one corner of the laboratory. As accessory to the potentiometers, there are four standard current-carrying resistances, ranging from 0.1 ohm to 0.00002 ohm, providing for accurate current determinations from 0.01 amp. to 2000 amp. There are also two volt multipliers, each having 15-volt, 150-volt and 1500-volt ranges. The galvanometers, as shown, are of the lamp and scale type, each having a light screen mounted on it to shade the scale from the general room lighting.

The potentiometer shown on the left in Fig. 1 is an old Queen instrument which was purchased in 1907, making it one of the first potentiometers used for central station work in this country. The other potentiometer was made by Leeds & Northrup and has been installed recently. All of the instruments mounted on this bench have been checked either by the Bureau of Standards or the Electrical Testing Laboratories.

Reserve standard cells and standard resistances are used to check the working standards every six months, at which time the working standards are also intercompared. It might be mentioned that all of these standards have shown a high degree of reliability with the exception of one standard resistance, which had an improperly brazed connection when received from the manufacturer. After repairs had been made on this the standard became satisfactory. The standard cells are kept in regular use until the regular checks show that the cell has begun to change from its rated voltage. We have found that the Weston cadmium cell will maintain its rated voltage for several years when regularly used if it has proper care.

Switches are provided under the standard resistances, as shown in Fig. 1, with connections arranged so that the heavy current leads and potential leads from any of the standard resistances may be connected in circuit. The single-pole switch on each standard controls the main circuit, and the double-pole switch to the left of this switch controls the potential tap circuit. Just under the heavy-current bus on this bench are two small double-pole, double-throw switches, one connected to each potentiometer. These connect either potentiometer to the voltage circuit used for checking voltmeters and wattmeters or to the potential taps of the standard current-carrying resistances. One potentiometer may be used for voltage work while the other is being used for current measurements, or both potentiometers may be connected in parallel to either the voltage or current circuits. The circuits of the potentiometer bench are given in Fig. 2.

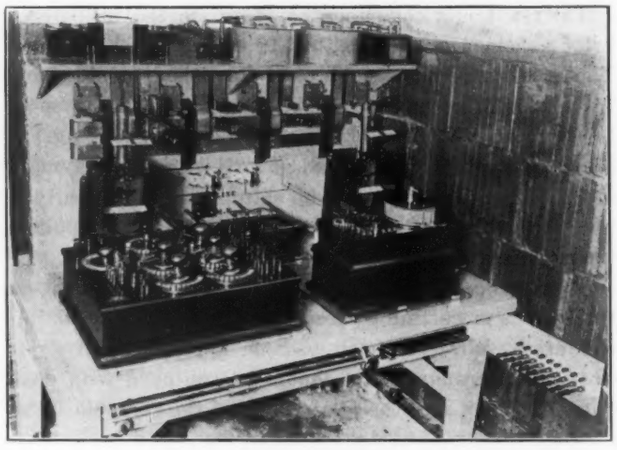


FIG. 1—BENCH CONTAINING POTENTIOMETERS, STANDARD RESISTANCE, AND VOLT MULTIPLIERS

Several years ago erratic results were obtained in the use of the potentiometer which it was finally found were due to stray currents leaking through the base of the potentiometer and over the insulated top into the galvanometer circuit. To prevent a recurrence of this trouble, the potentiometers, standard cells, galvanometers and auxiliary apparatus are all mounted on individual glass plates supported on small porcelain insulators which are covered with felt disks. The connections between all of the above apparatus are run in air lines, so that the possibility of leakage is reduced to a minimum.

The arrangement of benches, wiring and control apparatus was very carefully laid out to provide the maximum of convenience and to keep stray fields at a minimum. Referring to Fig. 4, it will be seen that the potentiometer bench is in the corner of the room, and facing it, at a distance of about 3 ft. (0.9 m.), is bench No. 1. This arrangement makes it possible for one man

to check either a voltmeter or an ammeter directly against the potentiometer. The tester, sitting between the two benches on a rotatable top stool, sets the current at approximately the desired value on bench No. 1, then turns to the potentiometer bench and with the

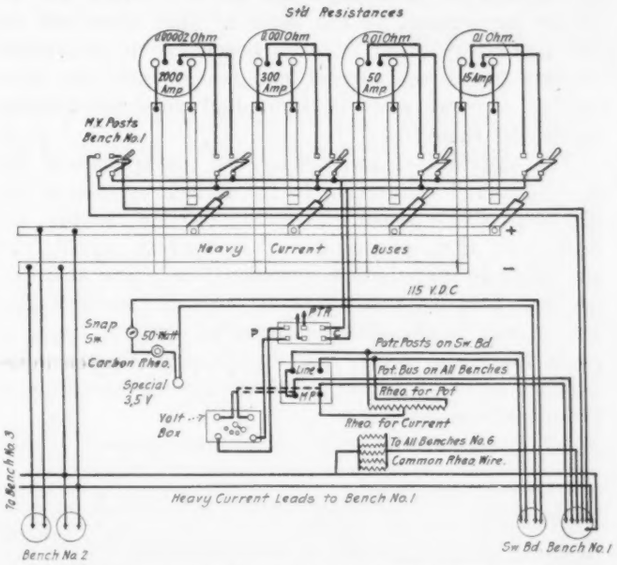


FIG. 2—WIRING DIAGRAM OF POTENTIOMETER BENCH

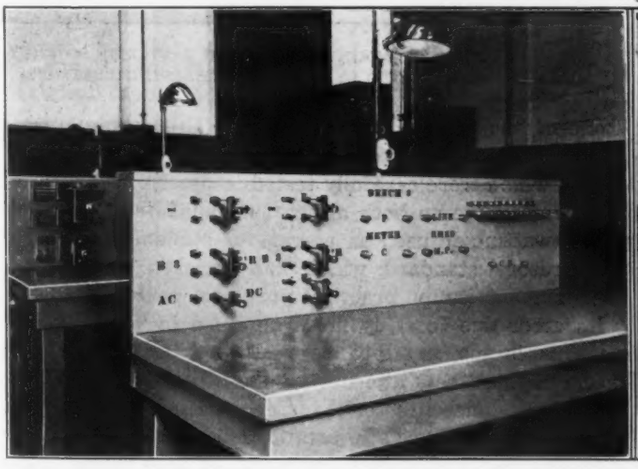
auxiliary rheostat on this bench adjusts the current to the exact value as indicated by the potentiometer. He takes a reading on the ammeter and then rechecks the potentiometer to see that the current has not changed. Checks may be made by one man in this way which are accurate within the reading error of the instrument.

The auxiliary-current rheostat on the potentiometer bench is controlled by the row of small knife switches shown in the extreme lower right-hand corner of Fig. 1. This rheostat will care for a maximum current of 50 amp., which is adjustable in 0.5-amp. steps. The small carbon rheostat which is mounted just under the bench in front of the Leeds & Northrup potentiometer is in parallel with the wire rheostat. This carbon rheostat is adjustable from 0.03 amp. to 0.75 amp.

A description of bench No. 3 will be given. The other benches are practically the same except that bench No. 1 has a current capacity for both alternating and direct currents of 200 amp., bench No. 2 of 2000 amp. and bench No. 3 of 50 amp. Moreover, bench No. 2 is not provided with reversing switches.

The bench is a very solidly constructed wood frame, on which is set a 2-in. (5.08-cm.) concrete slab with no metallic reinforcing. The switches and binding posts are mounted on the vertical back of the bench, as shown in Fig. 3. The three switches on the left control the current circuit, the bottom switch connecting the bench to either a low-voltage transformer for alternating-current supply or to the individual battery for direct-current supply. The double-throw switch above, when thrown to the right, connects the current posts of this bench through a loop to the potentiometer bench. When this switch is thrown to the left, the current circuit is limited to this bench only. The top switch of this row reverses the current on the bench post, but does not reverse the current supplied the potentiometer. The bottom switch in the row nearer the center excites the heavy current transformer. The next switch above this connects the voltage circuit to the potentiometer or to the bench individually. The top switch is a voltage-reversing switch. The row of small switches at the top right-hand corner of the bench are rheostat switches. These cut in zero temperature coefficient resistances, giving currents from 0.5 amp. to the maximum provided for that bench. Current ranges from 0.03 amp. to 0.75 amp. are obtained by a small carbon rheostat connected to the binding posts under these switches, marked "C. R." The wiring of current and potential circuits is shown in Fig. 5 and Fig. 6.

When the current circuits on any of these benches are connected to the potentiometer bench an auxiliary rheostat on the potentiometer bench is also connected in the circuit. This makes it possible to obtain the final adjustment of current at the potentiometer, regardless of which bench is being used. When the bench is used independently of the potentiometer bench, the standard meter and the tested meter are placed on the same bench and the control rheostats on this bench are all that are necessary.



FIGS. 3 AND 4—VIEW OF BENCH NO. 3, AND ARRANGEMENT OF TESTING BOARDS WITH RESPECT TO POTENTIOMETER BENCH

Voltage control for voltmeters and the potential circuits of wattmeters is obtained by means of a slide-wire resistance. The wire used is "Advance," which is wound on a tube approximately 2 in. (5.08 cm.) in diameter and 30 in. (76.2 cm.) long. The whole tube is con-

nected across the supply circuit, voltage for the instrument being taken from one of the supply lines to the slide.

Attention is called to the lamps which are hung over each of the test benches. The location of these lamps,

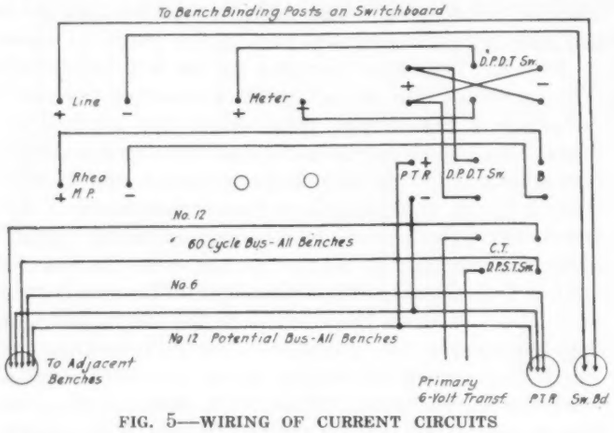


FIG. 5—WIRING OF CURRENT CIRCUITS

which was determined after some experiments were made, is such that a meter placed near the center of the bench receives excellent illumination on its scale and does not give a reflection troublesome to the tester. A socket is also connected just above the bench so that a fan or soldering iron may be connected when desired.

In Fig. 7 is shown a rear view of bench No. 2, with three 100-amp.-hr. three-cell storage batteries connected. This bench is arranged to take ten of these batteries for heavy-current tests. Bench No. 1 is arranged for two of these batteries and bench No. 3 for one battery. As by far the largest part of the checking is done on instruments under 100 amp. in range, this method of obtaining heavy current is very flexible and convenient. For charging, the batteries are slid from the platform shown onto a small truck of the same height as the platform and are hauled over to the charging platform, where all are charged in series through an adjustable resistance.

At the right of the battery is shown the 1000-amp.,

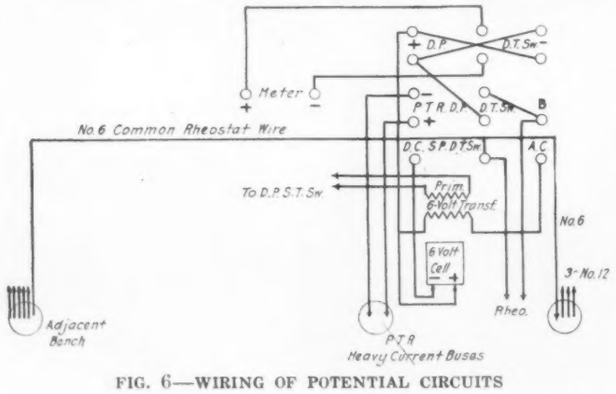


FIG. 6—WIRING OF POTENTIAL CIRCUITS

6-volt transformer which supplies the heavy alternating current for tests on this bench. Directly above this transformer is the heavy current rheostat which controls the current in 100-amp. steps from 100 amp. to 1000 amp. The finer adjustments of current are obtained by means of the small rheostat and switches as shown in Fig. 3.

The direct-current potential supply for the laboratory and for the meter shop on the floor below is obtained from a 300-volt battery in another room. This battery is wired to the laboratory distribution switchboard, at which point it may be connected to any or all of the benches as desired.

The scheme of voltage and current supply for the meter department is the same as that described for the laboratory; that is, each bench has its individual battery for direct current and transformer for alternating current and its individual zero temperature coefficient rheostats.

The distribution switchboard in the laboratory has a 110-220-volt connection to the Edison system, a 110-220-volt, single-phase alternating-current supply and a 220-volt, three-phase alternating-current supply from the 60-cycle distribution system. There are also connections to a 600-volt motor-driven direct-current generator and to the 300-volt potential battery. Any of these sources of supply may be connected to any of the benches or to all of the benches with the exception of the potentiometer bench.

All direct-current instruments are checked against

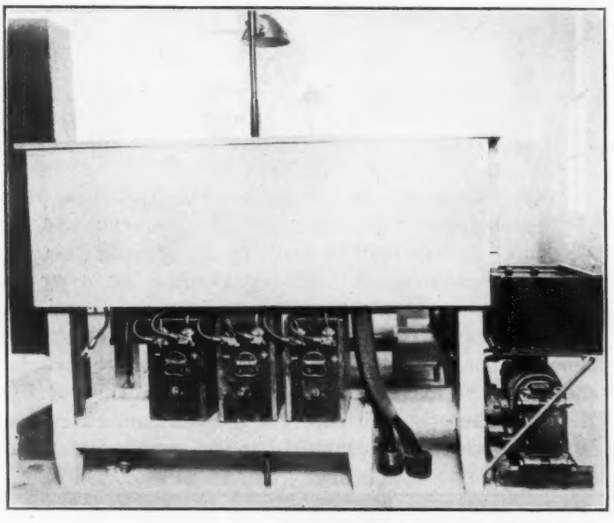


FIG. 7—METHOD OF MOUNTING TESTING BATTERIES SO THEY MAY BE TRANSPORTED BY TRUCK TO CHARGING PLATFORM

one of the potentiometers, and the alternating-current instruments are checked by means of transfer standards which were carefully tested to determine that they were accurate on both alternating and direct currents. The wattmeter used as a transfer standard is a large laboratory standard which has an even scale. This instrument is, for practical purposes, perfectly astatic. Its error due to stray fields obtained by any ordinary means is too small to be readable. Its accuracy is very high on both alternating and direct currents. The ammeter and voltmeter transfer instruments are of the same make and are also astatic. Their accuracy on both alternating and direct currents is very high. The laboratory wattmeter is frequently checked against the two potentiometers, one being used as a current standard and the other as the volt standard. When the greatest accuracy is desired the instrument is checked against the potentiometers both before and after being used as an alternating-current standard. This instrument is very permanent, however, and the second check has never shown any deviation from the first.

Good Location for Your Salesroom—How It Pays

An Array of Facts and Figures Concerning Profit That Have Been Gathered from the Experience of Many Central Stations in Various Sections of the United States

BY EARL E. WHITEHORNE

WHEN central station executives hire a salesman or a sales manager they measure him by a very simple standard. "Will he sell goods?" they ask themselves. "Will he make the right impression on the customer he calls on? Is he a worker or a loafer? Will he creditably represent this enterprise? Will he prove the most profitable man we could secure?" Those are the questions, and the man they pick must look right from all these angles. But did you ever sit back calmly and apply this test to the location of your office—of your store? Certainly this is no less important.

REMOTE LOCATION MEANS LOSS OF MONEY

When you stop to think of it, the maintenance of an office or a store by any central station is a selling effort. It is intended to bring closer contact with the public, more convenient intercourse, for the simple purpose of promoting better business, more sales of service and appliances. A good location, therefore, must be worth more than a poor one, just because a good location means a frontage on a busy street, where larger crowds are passing by and offering more selling opportunity. And the central station that is content to hide its office in a corner of the remote plant or keep its store on a side street, out of close touch with the shopping district, is losing money. Here is some evidence from central station men who have discovered this from actual experience in moving from a poor location to a good one. What they say is worth consideration by every manager while there is yet time to act, before the busy selling months between now and the holidays have slipped away.

About three years and a half ago, for instance, the Trumbull Public Service Company, in the little city of Warren, Ohio, moved its offices from off the side street. Read what New-Business Manager William J. Marshall has to say about it.

"Our company was located on a side street," he writes, "and our offices were small and about as unattractive as any I have ever seen. There was absolutely nothing inviting about them, and our consumers would duck into them, pay their bills and 'streak it' out as fast as they could go. They seemed to be afraid to come into the place, and wanted to get away as quickly as possible. If you spoke to them or tried to approach them in any way, they would say as few words as possible and go. I do not know that I can blame them. Had I not known that the people employed there were good, law-abiding citizens, I should have done the same thing. No appliances were sold whatever and there was no room to display them.

"We finally rented space in a new building in the very best location in the town, inducing the owners of the building to name it the Electric Block and to install a large electric sign on the roof reading 'Electric Block.' We installed the most modern equipment in the new offices and made them as attractive as possible. We also installed an attractive showroom and show window and a complete stock of electrical appliances, and on the front of our offices erected a large 'Do it electrically' sign with 2200 10-watt lamps. Some people said we were crazy—that it was not necessary and that we would never sell out our stock of appliances, but we were sure that if we made our offices so attractive and pleasant that it was a pleasure to come into them we should soon have the crowds coming in, that we would get better acquainted and closer to them, and could in a short time work up a very nice appliance business. The result, after three years, has shown that we were right.

"Our consumers now come in without any fear of being sandbagged. They stand around and visit and seem to feel that we are real human beings. They even come in to have a little chat when they have no business to transact, and on Saturday nights one would think we were holding a small reception—people coming in to say 'hello' and talk things over or to look over our line of appliances. And in the matter of appliances our sales have increased from nothing to an average of about $2,500 a month. Sales are increasing right along, and all appliances are sold at list and all show a good profit."

Mr. Marshall paints a graphic picture—one particularly impressive because it shows the strong conviction this experience has wrought upon him. "Attractive offices in a good location," he adds, "are bound to bring you closer to the people, and if you make the offices the show place of the town, the community will point to them with pride and feel that you are one of them and a booster for the town." No one will doubt the value to his company of such a friendly contact with the public.

EXPERIENCE OF INDIANAPOLIS COMPANY

Another similar case in a larger city has already received considerable publicity, but the facts are interesting in this comparison. The Merchants' Heat & Light Company moved its office in Indianapolis from a side street to a prominent corner in the shopping district. Before the company moved the average number of contracts taken in the office was about forty-eight a week. It never exceeded seventy-five. But when the new quarters were opened, with a big electric sign that marked the building as "The Daylight Corner," the average of contracts taken over the counter jumped at once to 160 a week, and appliance sales increased over 150 per cent. In fact, appliance sales alone are paying the entire cost of this investment in location, though the building houses all the general offices of the company. Surely such a move is justified.

But it is not only when the central station moves from a back street into the light of day that quick cash profits come. The Public Service Electric Company of

New Jersey moved its Newark office a while ago, although already it was basking in the center of the limelight. Let W. N. Halsey, the local agent, tell why this was done and what resulted. He says:

"It is true that our old building was considered one of the best locations in the city, fronting on Broad Street within one short block of the second busiest crossing in the United States. It was a store site hard to improve upon. Then again Broad Street, like Broadway, New York, was thought to have a 'good side' and a 'bad side' for trade, and we were moving off the good side to a location three blocks away and across one of the large parks. Many people shook their heads and predicted that our merchandise sales would fall off; but we had the advantage of locating in the same building with the big new trolley terminal, which is used by thousands of people daily, and also fronts on the principal street leading to the Hudson & Manhattan station, the 'tube' line to New York. In addition, we counted on the fact that Newark has become cosmopolitan, and it is no longer essential to success to have your enterprises located on the 'four corners.' The effect of this change of location is expressed by these figures better than words:

	January to June	July to December	Increase Last 6 Months Over First 6 Months	Total for Year
1915	$8,588.19	$17,445.58	$8,857.39	$26,033.77
1916	14,958.02	32,033.83	17,075.81	46,991.85
1916 over 1915	$6,369.83	$14,588.25	$8,218.42	$20,958.08
Per cent increase	74.1	83.6	92.7	80.5

"This remarkable increase in merchandise sales has more than justified our confidence."

What could better prove that where the crowds are passing there lies the business?

PROVIDENCE IS AN ILLUMINATING INSTANCE

In the experience of the Narragansett Electric Light Company's electric shop in Providence, R. I., we have still another test of location value, for here the salesroom was moved from an upper floor down into a real store on a prominent shopping street. A. H. Alcott, manager of electric shops, gives these figures:

"Our records as far back as 1912 for appliances unfortunately do not contain the amount of business secured in dollars and cents, but for comparison we happen to have our Christmas business for 1912, when we were located on the second floor of an office building with a showroom of about 100 sq. ft. Our Christmas business that year amounted to $2,089, but we moved to our present location in August, 1913, and from that time until Dec. 31 our sales amounted to $8,344.82, covering just four months. Our entire business for the year of 1914 amounted to $21,785.71, for 1915 to $27,777.12, and for 1916 our business amounted to $65,000, the above figures representing the sale of appliances alone.

"There is absolutely no question in our minds that our location on the street floor has been responsible to a very large extent for our increase in business, as our store is now much more accessible to our customers who wish to pay their bills there, and we are also able by keeping our windows attractive to show the merchandise which we are attempting to sell, which would have been impossible in our second-floor location, or even on a back street off one of the main highways. We are most enthusiastic about our store on the ground floor, as we feel that it is one of the best things we ever did to increase our sales of merchandise."

PHILADELPHIA AND BOSTON SPEAK

Again, the Philadelphia Electric Company many years ago moved just one block, off a back street to the main shopping thoroughfare, and its appliance sales jumped from $1,700 to $17,000 for the first year. On the other hand, the Noblesville (Ind.) Heat, Light & Power Company last fall reversed the operation with the effect stated below:

"This company," writes John T. Kesler, new-business manager, "built a new office during the year 1915, and its location is not so convenient to the business section of this city as the old office had been. Our idea was to get the office building in close proximity to the power house and storeroom, which are now all on the same block, the power house being just across the alley from the back door of the office. This was done to facilitate the management, something which in a small plant like this is desirable. From that point of view, the change has been a good one, but in the matter of greater sales of appliances and the number of people coming into and passing by the office it has not been an advantage. On the contrary, fewer people pass by and come into the office than did formerly, although we now have better office facilities and showrooms."

In short, it pays to be among those present. It pays to have a place of prominence among the other merchants if you intend to carry on a merchandising business and sell appliances at retail. Many companies that operate in a large number of communities have had an opportunity to experiment, and their opinions all agree. C. E. Greenwood, superintendent of appliance department for the Edison Electric Illuminating Company of Boston, says:

"We try to be very careful in the selection of locations for our suburban stores, appreciating the value of the 'business side' of the street even in small towns. First, we consider the geographic location from the standpoint of service to a district, and then we consider the importance of merchandising locations in that center. As a rule, we have been very successful, and in the one or two towns where experience has proved that the location was not right we have made or are now making plans to change to a location where our display windows can give their full value in attracting the public to the store."

Such is the experience of central station men in all parts of the country who have been able to make a direct comparison between a good and a poor location. Good location costs more money, but it is worth it, for it pays more profits in sales and in the value of a closer contact with the people on the street. An office on a back street means opportunity wasted. For location is as profitable to the central station as it is to any other kind of business.

British Grant for Research

In the British civil service budget for 1918 a grant in aid of scientific and industrial research to the amount of $5,000,000 is provided. The sum is to be distributed among approved industrial organizations and is to supplement the research funds of these associations.

THE PARALLEL OPERATION OF DISTRIBUTION TRANSFORMERS

The Development of a Low-Priced Reliable Protective Device for Low-Voltage Side of Network Eliminates Troubles

Many electric service companies which have tried to operate distribution transformers in parallel without success have learned that the lack of a suitable protective device for the low-tension side of the network was the principal source of trouble. To meet this situation

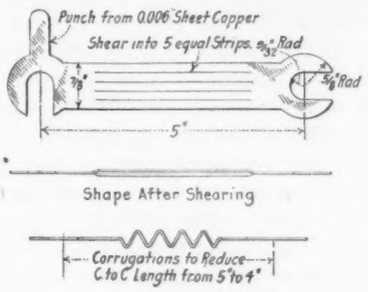

Punch from 0.006 Sheet Copper
Shear into 5 equal Strips
5/16" Rad
3/8"
5"
Shape After Shearing
Corrugations to Reduce C to C Length from 5" to 4"

FIG. 1—FUSE MADE OF SHEET COPPER AND DESIGNED FOR OUTDOOR SERVICE

S. B. Hood, superintendent of distribution for the Northern States Power Company, Minneapolis, Minn., has had the special devices shown herewith made.

The fuse consists of a sheet of copper, the link of which is sheared lengthwise into five parallel strips (Fig. 1). Each strip has a carrying capacity of 75 amp., the total rating of the entire fuse being 375 amp. When the fuse is installed all strips except those required to carry the current in the particular case are broken out by the linemen. When the full fuse is not sufficient additional fuse links are placed one on top of the other. The construction crews are guided in the installation of these fuses by the accompanying table.

With parallel operation two types of fuse are required, one for connecting two sections of the secondary network and the other for protecting the secondary side of all transformers operated in multiple banks. To permit installing the first type Mr. Hood employs a section fuse jumper like the one shown in Fig. 2. The break in the secondary main is made by inserting a standard porcelain strain insulator. The jumper arms are made of 0.75-in. (1.9-cm.) cast brass, and are attached to the line by means of clamps fastened with two ⅜-in. by 1-in. (9.5-mm. by 2.54-cm.) sherardized cap screws. The fuse is held in place between the jumper arms by cast-brass wing screws which permit quick renewal.

FUSES TO USE FOR TRANSFORMER SECONDARIES

Size of Transformer (Kw.)	Two-Wire, 110-Volt	Three-Wire, 110/220-Volt
3 and 5	1 strip	1 strip
7½ and 10	2 strips	2 strips
15	4 strips	3 strips
20	5 strips (1 fuse)	4 strips
25	1 full fuse plus 2 strips	1 full fuse (5 strips)
30	1 full fuse plus 3 strips	1 full fuse plus 1 strip
40	1 full fuse plus 4 strips	1 full fuse plus 2 strips
50	2 full fuses	1 full fuse plus 3 strips

For protecting the transformer secondaries the fuses are mounted on holders designed for pole mounting. The holder consists of a base of 1-in. (2.54-cm.) ebony asbestos lumber to which is bolted a galvanized-iron strap for fastening to the pole. A center clamp is used for rigidly supporting the neutral lead, which, of course, is not fused at any point but is solidly grounded to the water system at numerous points throughout the various networks. The fuse terminals for the outer wires on the secondary block consist of standard sherardized steel cap screws with recessed nuts in which the terminal wires are laid, the wires being bent into eyes to fit the recessed nut. The wires are held in position by hexagon nuts. Finally the fuse is clamped to this hexagon nut by a brass wing nut.

Experience has shown that after these fuses are installed it is possible to obtain as reliable operation and close regulation as with any direct-current network. The Northern States Power Company uses a standard size of 4000-2300/220-110-volt transformer for each section of the network, varying the spacing of the transformers to suit the load conditions. Operation of a network of the older type with a large number of transformers of various sizes in it is believed to be a treacherous undertaking. The company also operates the primary main in interconnected rings, never allowing more than a single transformer unit to be connected to any branch outside the ring system. This practice is essential in order to avoid a general blow-out following the breaking of a primary. If the ring system is properly worked out, the secondary leads by-pass the load around the break.

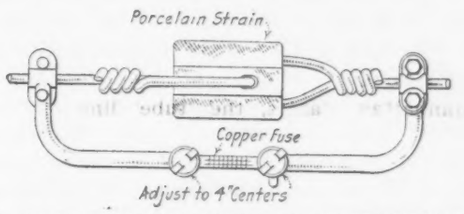


FIG. 2—JUMPER ARM AND METHOD OF INSTALLING SECTION FUSE

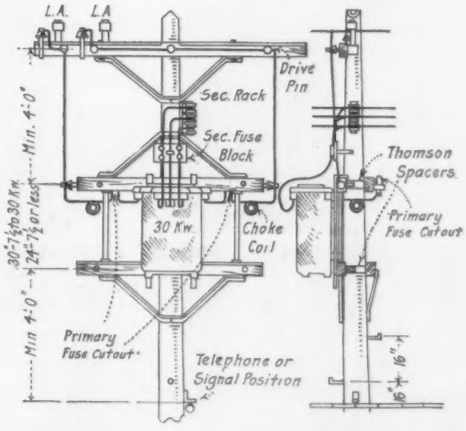


FIG. 3—METHOD OF INSTALLING FUSE BLOCKS ON TRANSFORMER POLES

Fuse cost is not the ruling factor in a problem of this sort, where reliability of operation and the maintenance of good regulation are to be balanced against cost. Nevertheless, it may be interesting that the cost of these fuses is 7 cents each and the cost of the holders is $2.25 each.

Success Follows Educational Sales Methods

Observations on the Electric Range Business as Seen by a Company Which for a Long Time Proceeded Cautiously and Is Now Driving Range Sales at Full Speed

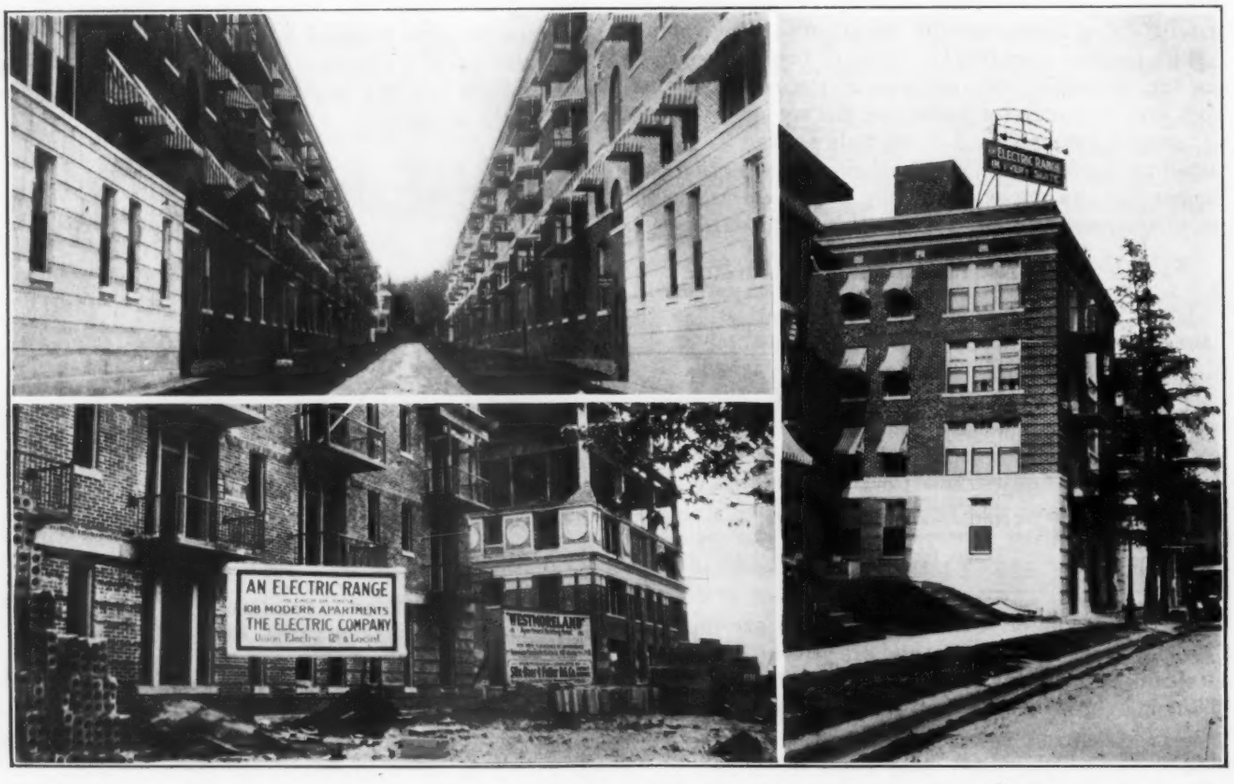
NINETY per cent of electric range sales at St. Louis, excluding apartment-house sales, are over-the-counter business. People walk into the Union Electric Light & Power Company's store and say, "I want to look at an electric range." After that the transaction is a straight merchandising proposition. Not many ranges are sold to customers on their first call, because it is generally necessary for the member of the family who makes this call to consult with the wife or the husband, as the case may be, before the deal is closed. Strangely enough, a large percentage of those who call to "look at" a range are men. But regardless of details it is a fact that the individual range sale business at St. Louis is becoming a merchandising business. This fact is the more striking when it is known that there are at present only approximately 2 per cent of the residential electricity customers in the city cooking electrically. Several factors, it is believed, have co-operated to bring about this condition. They are, it is thought, in the order of their importance, the apartment-house business, the electric cooking school, and the "cook-by-wire" advertising.

Apartment-house business has contributed to the electric cooking education of the St. Louis public in a large measure, because the first installations have been much talked about. Apartment-house dwellers as a class are lovers of leisure; they entertain and take more part in the social life of the city than the home dwellers as a general rule. For this reason they are an ideal class through which to spread the electric cooking idea by word of mouth; and it is quite generally believed that word-of-mouth advertising is most effective.

The effect of the electric cooking school has been practically of the same nature. A comfortable majority of the electric cooking school class which was just graduated and a like proportion of another which is just starting are from the great middle class of the city's inhabitants, the wives of home owners and of other well-paid employees. The electric cooking school is something new. It is, therefore, a live topic of conversation among these students in their respective circles of acquaintance.

Advertising in newspapers and on billboards has helped to associate the name of the Union Electric Light & Power Company with the interest created by word-of-mouth advertising. Moreover, printed advertising has been effective in definitely convincing the public that electric cooking is not a luxury but is a really economical method. Copy giving averages of actual monthly bills for families of different sizes has helped bring this about.

Briefly, the foregoing states the favorable electric range situation at St. Louis and gives what are thought to be the fundamental causes contributing to the estab-



TWO VIEWS OF APARTMENT BUILDING WHERE 144 SUITES HAVE ELECTRIC RANGES, AND HOW THE ELECTRIC COMPANY HELPS THE BUILDER TO GET TENANTS

lishment of this situation. A short history of the company's campaign utilizing these principles is also of interest.

The Union company started selling ranges during "Electrical Prosperity Week" in 1915. Before that it had done some experimental work and had placed a few ranges. During that week in 1915 it sold thirty-six

A Free Cooking School

For St. Louis Domestics

Madam, Send Your Cook—We'll Pay Her $7.50 for Her Time

The Electric Company has now arranged to teach "Better Cooking."

Lessons will be given in the form of lectures, with demonstrations. Equipment has been provided so that those attending the classes actually can cook the various dishes under an expert's direct supervision

To each St. Louis cook, domestic or maid who takes the complete course of 10 lectures we will pay $7.50 for her time in attending the school.

That means $7.50 for a few odd hours on different days.

If you are a mistress, it is to your advantage to urge your domestic to attend. You are privileged to come yourself if you like.

If you are in some family's employ, don't miss this opportunity to develop your talents for cooking. Hundreds will enroll and earn this money. Resolve right now to be among the first.

Why We Make This Unusual Offer

Cooking electrically is today accepted in 3000 cities as the superior method of preparing food. We want all those employed in St. Louis kitchens to know more about it.

We want them to learn how easy, how simple it is to use an electric range. We want you to see how it saves you work and how much more delicious it makes the meals.

Hundreds of electric ranges are in daily use in St. Louis. More are being installed each week. To be valuable nowadays, a cook must be up-to-date.

This Expert Will Teach You —Enroll NOW!

Mrs. Margaret M. Williams Winn, the domestic science authority until recently in charge of the St. Louis School of Housekeeping, with her corps of trained assistants, will conduct our Cooking School. She will cook many foods in many ways. And she will use only an electric range.

The school starts March 14th—but don't wait for that. Thousands will want to take this course and earn $7.50. You must let us know before the classes are all filled.

Come, write or telephone NOW and give us your name.

Electricity is Cheap in St. Louis

The Electric Company

UNION ELECTRIC: Main Office:—12th and Locust

The Terms Are These:

1. Course of 10 lectures conducted by Margaret M. Williams Winn.
2. We pay $7.50 cash to those attending ten lectures.
3. A diploma signed by Mrs. Winn will be given at the completion of the course to those who acquire the required degree of efficiency.
4. The names of those who prove to be the best cooks and are given diplomas will be kept on file. This enables us to supply the names of our graduates when, as often happens, we are called upon by those seeking a competent domestic. The company, however, will not act as an employment bureau.
5. The school will be held on the tenth floor of the Union Electric building, Twelfth and Locust streets.
6. Classes are limited to 25 persons. When all the classes are filled no more can enter.
7. White caps and aprons will be furnished free of charge to all who attend.

AFTER TWO INSERTIONS OF ADVERTISEMENT 1089 APPLICATIONS FOR ENROLLMENT WERE SECURED

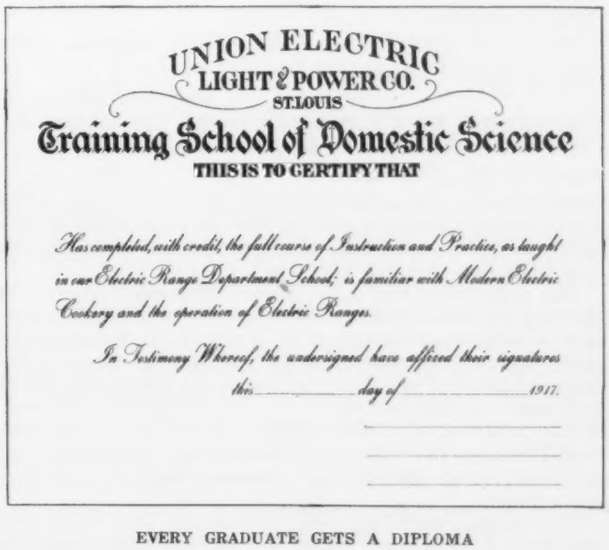
ranges. Those thirty-six ranges were carefully watched, and more were sold from time to time, until, on Jan. 1, 1917, the company had about 400 ranges installed on its lines. One of the strongest factors in the sale of the 400 ranges was the company's 120-ft. by 20-ft. (36.58-m. by 6.1-m.) cooking exhibit at the Household Show, at which three range manufacturers assisted in conducting an educational demonstration employing a total of about ten cooks, ten salesmen and a large force of servants. Fifty-two ranges were sold during that week and several hundred prospective customers were discovered. Its experience with these 400 ranges convinced the company that it should go after range load with all possible force.

As a part of the educational plan an electric range sales department was organized. It consists of three salesmen, one saleswoman and demonstrator, and three women who are primarily demonstrators. Working in co-operation with this sales organization is the cooking school force. The terms of the company's range proposition to the public were that the company would sell a range at list price installed and at the end of forty-five days, if it did not perform as promised, it would be removed and all money refunded except the charge for energy actually used. An initial payment of one-tenth of the range price was asked and the balance could be paid in twelve payments. The payment of one-tenth down restrained people who had no intention of buying from imposing on the company. Salesmen's commissions were paid only after the forty-five-day period had elapsed.

The two big features of the business in 1917 have been the electric cooking school and the apartment-house sales. The school was inaugurated primarily to educate the company's salespeople and demonstrators and a large number of St. Louis housewives. As the result of two 6-in. by 10-in. (15.24-cm. by 25.4-cm.) newspaper advertisements announcing the school, a significant feature of which was the offer of $7.50 to each person who satisfactorily completed the course, 1089 applications for the electric cooking course were secured. The advertising campaign was discontinued immediately, but in response to a very small advertisement calling a meeting of the applicants more than 1500 women besieged the appointed place. It was, of course, impossible to handle such numbers, but ten classes of forty-eight women each were formed to run for ten weeks, as indicated in the proposition reproduced herewith. Each class comes two hours a day once a week. There are two classes each weekday except on Mondays and Saturdays.

The terms of the school, as contained in the advertisements, were as follows:

1. Course of ten lectures conducted by Margaret M. Williams Winn.
2. We pay $7.50 cash to those who attend all ten lectures.
3. A diploma signed by Mrs. Winn will be awarded those who attain the required degree of efficiency.
4. If these graduates are ever without a position we will suggest their names to persons who want to employ a competent cook or domestic and call upon us to assist them, as often happens. But the Electric Company does not conduct an employment bureau.
5. The school will be held on the tenth floor of the Union Electric Building, Twelfth and Locust Streets.
6. Classes are limited to twenty-five persons. When all the classes are filled no more can enter.
7. White caps and aprons will be furnished free.



UNION ELECTRIC LIGHT & POWER CO.

ST. LOUIS

Training School of Domestic Science

THIS IS TO CERTIFY THAT

Has completed, with credit, the full course of Instruction and Practice, as taught in our Electric Range Department School; is familiar with Modern Electric Cookery and the operation of Electric Ranges.

In Testimony Whereof, the undersigned have affixed their signatures this _____ day of _____ 1917.

EVERY GRADUATE GETS A DIPLOMA

The members of the first group of classes have just

been graduated and have received diplomas. Of the original 480 members, 417 finished the course and 407 were graduated. At the final sessions several questions were put to the classes to determine the effect of the educational effort. Only two of the 480, it developed, knew anything about electric cooking before the school was announced. There was only praise—absolutely no criticism—of the method of conducting the school in spite of the fact that discipline had been purposely made very strict. A question as to how many could conscientiously recommend the electric range brought a ringing cheer. Sixty prospective customers were turned in by the students, and among the sixty it was found that forty ladies had turned in their own names. The full effect of the school is well shown in the letter reproduced below. The second group of classes is now going through the school. When those composing it have completed the course there may be a change in the general plan of operating the school.

The company's success at securing apartment-house business is attributed to its plan of going after it. C. E. Michel, manager office sales department, by talking to real estate people, learned that apartments, to rent easily nowadays, must have "all the frills." He himself took the electric cooking idea to the largest and most progressive speculative builder in the city and sold it as a "new apartment-house frill." The result speaks for itself.

The company to date has sold 1080 ranges. Of these 252 are installed in apartment houses; 442 are sold but not yet installed. In addition to this the company has practically closed orders for 520 more ranges. Practically all of these will go into apartment houses.

Broadly speaking, the company is convinced that the electric range is the most important merchandising and service development in which it is engaged. It appears to be comparable with the beginning of incidental power service for day load inaugurated by the early electric light companies.

This is what a student wrote to the company after completing the course:

St. Louis, Mo., June 19, 1917.

Union Electric Light & Power Company,
Twelfth and Locust Streets, St. Louis, Mo.

Attention Mr. C. E. Michel.

Gentlemen—Since the free cooking class of which I had the privilege of being a member has been completed, I have been wishing to express my appreciation in a more tangible way than just thinking about it.

The experience was a very wonderful one for me. In fact, I have been using an old gas stove for all my cooking, and to become acquainted with the modern electric appliances was a revelation indeed. As soon as there is the least possibility I will surely exchange the old for the newer way, and will lose no opportunity of telling all my friends of the advantages of the electrics. Even though at first, until I became acquainted with the stoves, I was very much afraid of them—primarily, I suppose, because I couldn't see a flame.

The lessons were not only interesting but were very practical—I have been using the recipes daily—and the teachers made it a delight to attend.

The last, and perhaps the greatest surprise of all, was the check so kindly handed to us. The privilege which the Union Electric Light & Power Company has granted so many women of St. Louis will have a wide influence if it touches each one as deeply as it did me. It took me out of my kitchen into a bigger world, and I want you to know that I have very much appreciated the uplift.

Very respectfully,

THE AGING OF RUBBER INSULATING COMPOUNDS

Data on About 250 Laboratory Tests Which Are Quite Representative of Results Secured Throughout Investigation.

As pointed out in the Aug. 18 issue of the Electrical World, the Underwriters' Laboratories has been conducting a series of tests bearing on the life of the rubber insulating compounds employed on wires and cables. A complete record of the results of the tests is beyond the scope of this article, but a tabulation of the test results obtained during the six months' period ended July 1, 1917, has been completed and a partial summary of the tests is given in the accompanying table. This table includes the data of about 250 tests, and is quite representative of the character of the results obtained throughout the investigation. Data on tests for permanent set are not given, as the work has shown that this property is not materially affected by three years' aging.

The "percentage loss" figures are possibly not absolutely correct. Owing to changes and improvements in test methods and apparatus made in three years, the results may not be exactly comparable, but it is considered that they are quite representative of the performance of samples after three years' aging. In connection with the work, samples showing excessive deterioration have been traced in regard to their original performance in the chemical tests, in case such tests have been made. In a large percentage of these cases the sum of the percentages of acetone, chloroform and alcoholic potash extracts, total sulphur and ash have been found to exceed the specified total of 80 per cent. It may also be mentioned that the converse has in general been found to hold good, as most samples showing super-standard qualities in the chemical tests performed favorably in this work. Many of the samples are to be tested after another year of aging.

AGING OF RUBBER INSULATION

Average Tensile Strength, Lbs. per Sq. In.		Per Cent Loss in Tensile Strength in Three Years	Average Elongation, Inches		Per Cent Loss in Elongation in Three Years
New	Three Years Old		New	Three Years Old	
673	647	3.8	7.7	6.8	12.1
673	580	13.8	7.1	5.7	20.0
655	647	1.2	6.5	4.7	28.0
650	532	18.1	6.9	6.0	13.7
649	624	3.9	6.8	5.6	18.1
602	505	16.2	6.9	5.9	14.9
552	503	8.7	6.6	5.5	16.8
533	517	3.0	7.2	5.8	19.6
531	538	*1.3	7.2	5.9	18.3
521	501	3.7	6.2	5.6	10.2
498	486	2.6	6.6	5.1	22.3
497	415	16.5	6.8	5.4	21.2

*Indicates gain in tensile strength.
An average of about 450 tests conducted during the last six months shows losses of 10 per cent for tensile strength and 18.2 per cent for elongation.

Make-and-Break Contact

To overcome the expense of platinum contact members in spark coils Horace V. Taylor of Pittsburgh, Pa., suggests replacing at least one of the contact members with tungsten. The combinations silver tungsten and platinum silver are made the subject of patents No. 1,232,624 and No. 1,232,625.

Apparent Sunlight for Underground Passage

Daylight Lamps with Reflectors Throw Light Through Windows of Translucent Glass of High Transmission Efficiency— How a Solution for New Problems Was Found

AN unusual underground passageway has been constructed through a hill on which the laboratory and office buildings of the National Lamp Works are situated at Cleveland. The purpose of the passage is to provide a safe and comfortable approach to the top of the hill in addition to an outdoor stairs, the latter having proved unsatisfactory during the bad weather which sometimes prevails on the shore of Lake Erie at that point. As soon as it was decided to build the passage it was learned that while the desirable characteristics for such a structure are well known there is no established method of accomplishing the desired ends.

For instance, it was considered very necessary that the passageway be dry and be well lighted. On account

FIG. 1—THOUGH UNDERGROUND, THE LIGHT IN THIS PASSAGEWAY APPARENTLY IS SUNLIGHT

of the fact that the subway, as it is called, is 312.92 ft. (97.9 m.) long, and on account of the further fact that it rises 34.22 ft. (11 m.) in that distance, the problem assumed more than ordinary proportions.

Keeping the walls free from condensate so that the subway would always be dry proved comparatively simple; but not so the lighting. The primary object to be attained by the lighting was twofold. It should remove that dingy atmosphere which is present in almost all underground passages, and it should enhance the appearance of the interior, eliminating the "rat-hole" impression that a visitor frequently receives in passing through such a long tunnel.

As the first step in determining what sort of lighting would best accomplish these effects, a quarter-scale cardboard model was built and several schemes of lighting it were tried. It was decided as the result of this rough investigation that lighting which would simulate daylight in color and distribution would be the most desirable. Such a lighting scheme, it was believed, would lessen the sense of being underground. While it was not the intention to convey the impression of an up-ground passageway, the simulation of daylight is so complete that many visitors are deceived.

All of the lighting-circuit leads are run in conduit laid in the air ducts between the walls. At each of the thirty-two windows a branch is taken off one of the three-wire No. 8 lines to serve a 100-watt, 110-volt blue-glass daylight lamp installed in a show-window lighting reflector. The type of three-wire circuit which is used was selected so that the line drop could be taken care of by installing lower-voltage lamps of a single rating for the entire length. The glass used in the window panes is a translucent glass known as "cynite," that is high in transmission efficiency but is sufficiently scattering in its refraction not to reveal any of the details of the wall behind it.

From Fig. 1 it will be noticed that uniform illumination is not provided. This was in order that the alternating lights and shadows might break up the long passageway and make it seem shorter. In placing the windows locations were selected which would allow adequate lighting of the 4 per cent ramps and five runs of stairs, which are laid out with eight steps to the run. The plan of placing the windows opposite one another was considered better than staggering them, since the latter arrangement would have given the subway a zigzag effect.

Of equal importance with the consideration of effect of the lighting came that of its reliability, for darkness in such a long, narrow passage at rush hours would create an extremely dangerous condition. Solution of the reliability problem was reached by installing an emergency lighting circuit carrying six 15-watt tungsten lamps, which operate continuously on the central station lighting circuit as long as energy remains on the lines. Should this power source fail, a relay which is retained in position only by the central station energy would, actuated by gravity, fall and connect the emergency circuit to a storage battery ordinarily used in the laboratory for testing work.

The main lighting circuits are arranged for either manual or automatic control as desired. There are door switches at both entrances to the subway arranged so that pushing the door inward turns on the thirty-two daylight lamps whenever the control mechanism is set for automatic operation. The same action sets a time switch in action so that it will turn the lights out in four minutes. A person can walk through the subway

in from one and one-half to two minutes. Should another person enter the passage before the end of any four-minute period for which the lamps are lighted the

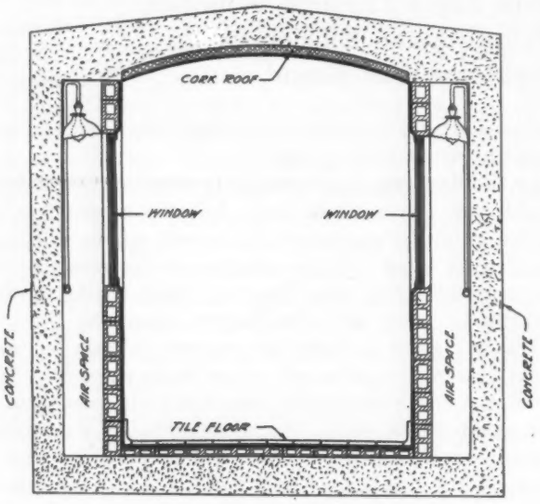


FIG. 2—CROSS-SECTION THROUGH SUBWAY SHOWING POSITION OF CONDUIT LINES AND LAMPS

time switch would be automatically set back to its starting point.

These automatic operations are all performed on a panelboard, the essential elements of which are a standard remote-control switch, a clock mechanism connected to the subway door switches, a relay for the emergency lighting, a small three-pole knife switch for cutting out automatic operation and substituting manual control, a pilot lamp in the emergency circuit, and a push-button in the door circuit which can be used in testing at the board. The arrangement of these parts in the circuit is given in Fig. 3.

The automatic system will properly take care of the lighting for all ordinary traffic in the subway. It has been found, however, that, at least during the winter months, the automatic system keeps the lights on continuously through the greater part of the day on account of the frequency with which the subway is used. Therefore it has been considered advisable to disconnect the automatic mechanism during the busy hours of the day. This can be done by a watchman on his regular rounds and it saves the wear on the mechanism. The automatic system is most useful in taking care of the lighting after the busy hours are over and during the hours and days of infrequent traffic.

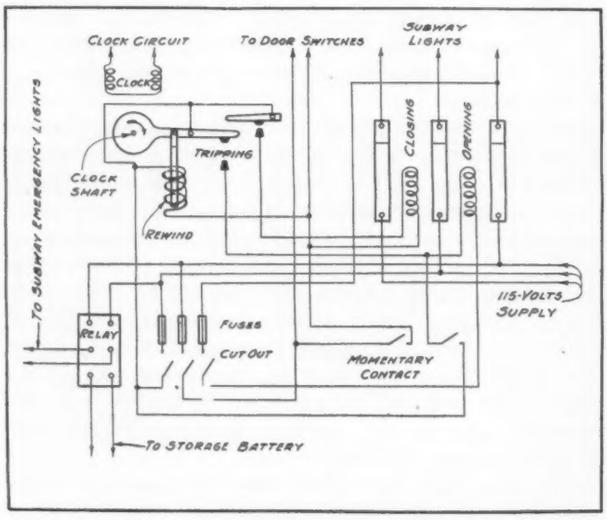


FIG. 3—DIAGRAM OF CONNECTIONS FOR APPARATUS ON THE AUTOMATIC CONTROL PANELBOARD

The entire work of the design was done by Evan J. Edwards of the laboratory's engineering staff. His original solution of the engineering problems recounted here is of special interest because so far as it is known the problems are entirely without precedent.

ACCURATE METHOD OF MEASURING MOTOR SLIP

Contactor on Motor Shaft Connected with Relays So that Slip Is Automatically Recorded with Exactitude

BY MILTON M. FLANDERS

If the speed of a motor is taken with an ordinary speed counter, an error of one-half of 1 per cent is not unusual. With a machine operating at 900 r.p.m. and having a slip of 45 r.p.m. this would mean an error of 4.5 r.p.m. Expressed in terms of slip, this error would become 10 per cent, and usually the error would be greater. Tachometers, especially the hand type, if constructed for any great range, are difficult to read and

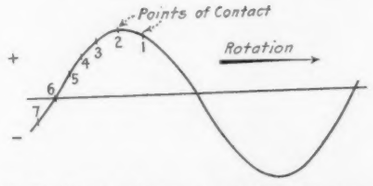


FIG. 1—MOVEMENT OF POINTS OF CONTACT ON WAVE WITH MOTOR RUNNING AT LESS THAN SYNCHRONOUS SPEED

usually unreliable for work approaching precision. Therefore it may be seen that some special method is required for obtaining slip accurately.

A device which does not have the foregoing objection has been developed by the writer. From several years' experience with this device in varied forms it has been found to yield very accurate results. The principle on which the apparatus operates is as follows: If the shaft of the motor under test is arranged to rotate a contactor at the same speed as itself, completing a circuit once during each revolution, and this circuit be connected to a source of the same frequency as the motor supply, it is evident that at synchronous speed any device in the contactor circuit would be energized once for each revolution. It is also evident that the circuit would be subjected to an undirectional pulsating voltage, the direction and magnitude of which would depend on the point of the alternating-current wave at which the contact was made. If the motor runs at less than synchronous speed, the point of contact, instead of being at the same point of the wave for each revolution, would be a little farther back for each succeeding contact, as shown in Fig. 1. As the motor continues to slip, the voltage applied to the contactor circuit will rise to a maximum in one direction, fall gradually to zero, rise again to a maximum in the reverse direction, and again fall to zero for each cycle slip of the contactor, and consequently of the rotor.

If a single stroke bell is connected in the contactor circuit, every alternation slip will produce a stroke, the hammer returning to the off position at each zero point. If this bell is a polarized bell, one stroke will be eliminated and the bell will strike once for each cycle slip, since each alternate impulse is reversed in polarity. For high slip any attempt to count the strokes of the bell is useless, and the device in this form is very far from satisfactory.

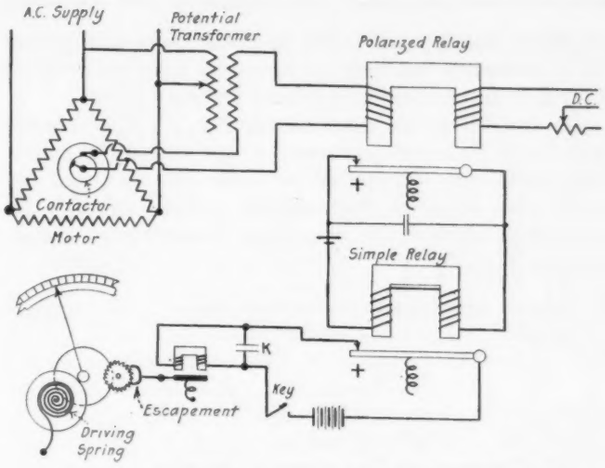


FIG. 2—DIAGRAM OF DEVICE FOR MEASURING SLIP

The completed instrument, as shown in Fig. 2, consists of a small potential transformer with adjustable taps, giving a constant secondary voltage for several standard motor voltages. The contactor may be of the speed-counter type, shown in Fig. 3, or may be mounted on the motor. In the latter case, rubber tips do not give satisfaction, and a better way is to drill a ⅛-in. (3.18 mm.) hole in the shaft center and insert the end of the contactor spindle, which has been tapered to fit tightly enough to prevent slipping. This contactor has its brushes connected in series with the secondary winding of the potential transformer and a relay consisting of two windings on a common core, one of which is excited by the contactor circuit, the other from a direct-current source. When the current in the contactor circuit is in one direction, the flux from each winding neutralizes the other and no attraction of the armature occurs. When the polarity in the contactor circuit is reversed the two fluxes aid one another and a very positive attraction occurs. This relay is provided with an ordinary armature and secondary contacts.

In the secondary circuit of this relay is a simple relay operated by one or two dry cells. Its function is to relieve the delicate polar relay just described of the heavy duty required to operate the recorder. This relay is not necessary but makes closer adjustment and higher speed possible. These relays are mounted in a case with the potential transformer at any convenient place. Leading from this case are two pairs of wires, one pair leading to the contactor and the other to the recorder from the secondary circuit of the simple relay. This circuit is energized by several dry cells as may be required.

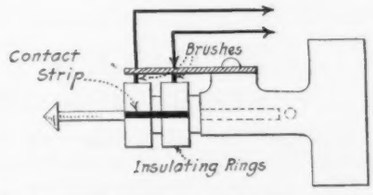


FIG. 3—SPEED-COUNTER TYPE OF CONTACTOR

The recorder consists of a clock train driven by a coiled spring and controlled by an escapement. The ratio of the gearing is such that the indicator hand makes one complete revolution for 100 strokes of the escapement lever. The indicator dial has 100 equal divisions. The escapement lever is held to one side by a strong hairspring and has an armature attached which, when attracted by electromagnets, will allow the escapement wheel to move one tooth. The electromagnets are connected in the secondary circuit of the simple relay, which circuit may also be closed by a key.

With these arrangements every cycle slip will cause the polar relay to operate once, which in turn energizes the simple relay and moves the indicator one division. In actual use the stop of a stop watch and the key are closed simultaneously and the slip taken for one minute. With reasonable care an accuracy of one-half of 1 per cent may be obtained. The synchronous speed of the machine is determined from the reading of a standard frequency indicator.

If the slip is desired in r.p.m. a convenient method is to divide the cycles slip by the pairs of poles of the induction machine. It is evident that the slip may be recorded equally well for either over or under synchronous speeds within large limits. The apparatus described has been used to measure slips up to 550 cycles per minute without trouble. To permit high-speed operation all arcing points on the relays must be bridged by condensers to permit close adjustment without arcing across the gap.

VENTILATED BASE FOR USE WITH NITROGEN LAMPS

Base Is Separated from Neck of Bulb by a Space Which Is Used for Purpose of Ventilating the Lamp Base

The temperature to which the base of nitrogen lamps is heated is in some cases sufficiently high to take the temper from the spring contacts and other parts of the base and its connecting socket. In consequence John H. Dale of New York City has brought out in patent No. 1,231,335 a means for separating the base from the neck of the bulb by a space or chamber, the base being supported upon the lamp bulb in such a manner that the heat of the bulb cannot be transmitted directly by conduction to any material extent to the lamp base. This space is then used to ventilate the lamp base. The lamp base proper is supported upon the lamp by means of a skirt which is similar to the one used in the existing forms of nitrogen lamps and which is secured to the upper end of the neck by an annular ring of cement. The lamp base proper also comprises a skirt, which has secured to it by means of the glass insulation the usual screw plug.

Ventilating openings are provided in the skirt near its connection to the screw plug, the openings in the ring and skirt being spaced but a slight distance apart so that a circular row of holes is provided in each instance.

STATION AND OPERATING PRACTICE

A Department Devoted to Problems of Installation, Operation and Maintenance of Equipment for Economical Generation and Distribution of Electrical Energy

OVERCOMING TROUBLE WITH REVERSE-CURRENT RELAYS

Burning of Fiber Pieces Holding Tripping Contacts Remedied by Using Low-Voltage Release Trip Coils Operated by Gravity

BY J. R. BALDWIN

Reverse-current relays on the circuit breakers of rotary converters in a Southern station were giving trouble owing to the burning of the fiber pieces holding the tripping contacts. The circuit breakers were tripped by shunt trip coils, an auxiliary contact being placed on the breaker to open the circuit. A slight kick in the voltage would cause the contacts on the relay to close, but they would open before the shunt-trip coil worked. This would draw an arc due to the inductive effect of the coil and it would hang on until the fiber burned up.

The trouble was remedied by using low-voltage release trip coils operated by gravity. The circuit is not opened on this type of relay, but a coil of low resistance is short-circuited by the relay contacts, the coil being in series with a high resistance.

MAST ARM FOR SERIES STREET-LIGHTING UNITS

Replaces Center-Span Suspension as Used for Carbon Arc Lamps—Pole Not Required on Opposite Side of Street

Where Mazda C series units of 400 cp. or 600 cp. have replaced inclosed carbon arcs for street lighting,

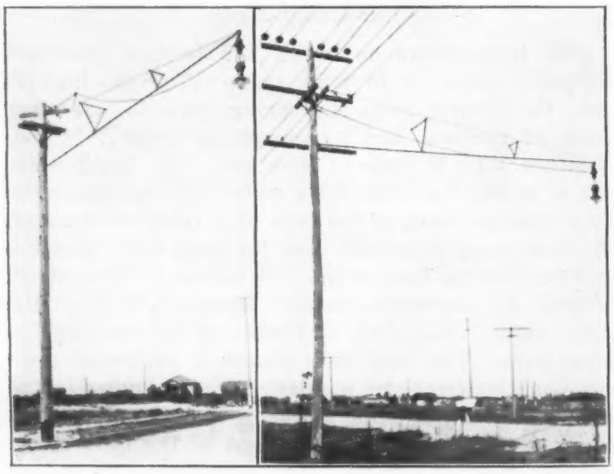


FIG. 1—TWO INSTALLATIONS USING MAST ARM

it is no longer necessary that the lamp be suspended in the exact center of the street intersection, particularly in residence districts. Center-span suspension, while having many undeniable advantages, is nevertheless objectionable, owing to the poles and guys required on the corner opposite to the line pole, as in soft ground it is necessary not only to have the span pole but to hold it with one anchor guy and one stub guy.

On streets having sidewalks 12 ft. (3.7 m.) or more wide with full radius curves at the corners a rather long mast arm is required to throw the lamp out beyond trees or other obstructions on both streets. To solve this problem the San Diego Consolidated Gas &

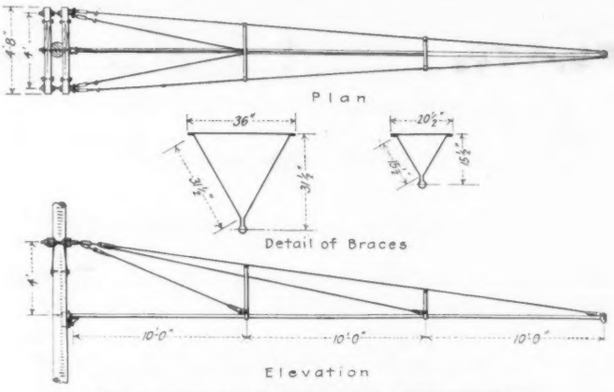


FIG. 2—DETAILS OF MAST-ARM CONSTRUCTION

Electric Company has adopted as a standard for city service a mast arm 30 ft. (9.1 m.) in length. As will be seen from the accompanying illustration, the mast arm is of simple construction and of such materials that, except the pulley castings at the two ends, it may be fabricated entirely in the company shops. The use of turnbuckles on all guys permits perfect leveling in the field.

A 600-cp. series compensator lamp unit, including absolute cut-out, weighs 60.5 lb. (27.4 kg.). The mast arm is capable of sustaining 110 lb. (49.9 kg.) before bowing at any point and much more before failure.

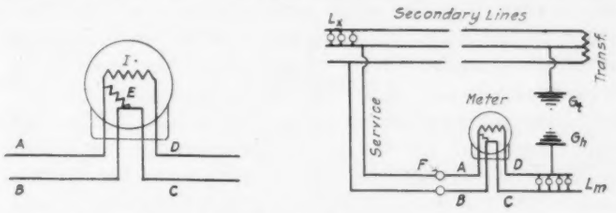
In installing the mast arm the brace arm is usually attached to the pole directly under the primary line arm and the pole plate under the secondary line arm. A duplex feed is used, specified as No. 8 (19 No. 20) duplex 3/64-in. (1.19-mm.) new N. E. C. rubber insulation with braided weatherproof single braid over all.

METER CONNECTIONS FOR DISTRIBUTION CIRCUITS

Right and Wrong Way of Connecting Two-Wire Meters to Three-Wire Grounded Neutral Circuits Outlined

Assuming the usual three-wire 110-220-volt secondary distribution system with grounded neutral, it is not generally recognized that there is a right way and a wrong way, almost as common, of connecting up the ordinary two-wire 110-volt consumers' meter to such a system. Referring to Fig. 1, wire *A*, which leads to and through the current coil of the meter, should never be connected

to the neutral or grounded wire of the transformer secondaries if the workman desires to give the best kind of service to his company. If such a connection should be made as is shown in Fig. 2, and the fuse *F* should become loosened or blown, it is apparent that an accidental or intentional ground on wire *D* of the house wiring would supply the load without the regis-



FIGS. 1 AND 2—INTERNAL CONNECTIONS OF SINGLE-PHASE METER; CONDITIONS THAT CAUSE WRONG REGISTRATION

tration of the meter. Such a condition can always be prevented by connecting wire *A* of the line side of the meter to the phase side or ungrounded side of the service wires.

A further study of Fig. 2 shows that, although the fuse *F* may be intact, the two grounds, G_t and G_h act as a shunt across the current coil of the meter, and as such supply a part of the load unmeasured by the meter, depending for its magnitude on the resistance relations of the grounds and of the neutral secondary wire. This undesirable condition might go on for years.

Again, if conditions are right, although there might be no load on the meter shown, energy from the transformer ground, back through the house ground and the meter, might help to feed some other load entirely separate from the meter load L_m, as load L_x, thereby running the meter backward, a condition which is particularly common in buildings having a three-wire service but two-wire meters for separate offices. The latter condition, the writer knows, is a constant source of mystery to more than one meterman who ought to understand it. The conditions described suggest other interesting variations, but the important point is this: If this matter, simple as it is, has anything to do with net revenue, it deserves more widely distributed attention among central station metermen.

REBUILDING A FEEDER BOARD WITHOUT STOPPING SERVICE

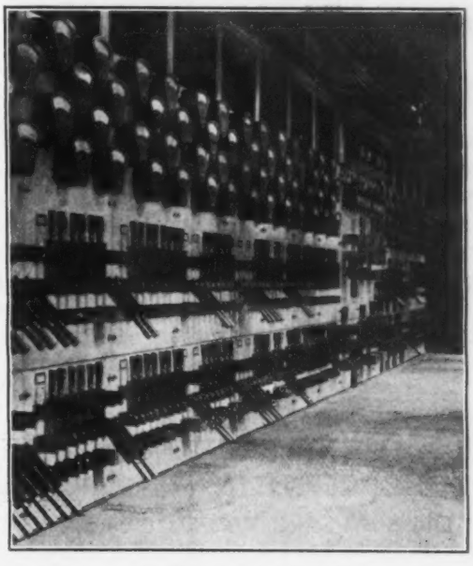
Temporary Service Panel Was Connected to Circuits While Corresponding Feeder Panels Were Being Reconstructed

Reconstruction of an Edison three-wire feeder board to provide for double the number of circuits formerly handled was recently made necessary in Station C of the Pacific Gas & Electric Company. Since the circuits controlled could not be de-energized for the entire period required for reconstruction, the work was done without interrupting service at all, this being accomplished by the use of a temporary panel.

The original board consisted of twenty-one 3-ft. by 7½-ft. (91.4-cm. by 228-cm.) marble panels, each one consisting of two sections—28 in. (73 cm.) and 62 in. (157 cm.) high respectively. All of the switches (two double-throw single-pole knife switches to each positive and negative circuit) and the ammeters (one for the positive and one for the negative circuit) were installed on the upper or larger panel, the lower one being left blank and serving only to give a finished appearance to the board. The positive meters were arranged along the top of the board and the negative meters just below. As two sets of negative and positive busbars arranged in one horizontal plane were used, and all of the switches were in one horizontal row, considerable copper had to be used for jumpers between the busbars and switch lugs.

To provide for the new circuit it was decided to install the new switches on the lower blank panel and regroup the meters on the upper panels to allow for those required for the new circuits. The latter operation was accomplished without disfiguring the panels by inverting the upper panel, plugging the old holes with plaster of paris and drilling new holes as required. The ammeters covered most of the plugged holes. To avoid the use of excessive amounts of copper, all of the switches on the upper panel were used as positive switches and those on the lower panel as negative switches. This required a rearrangement of the busbars. Instead of using four busbars in one horizontal plane as before, one busbar was supported back of each row of switch lugs, thus requiring only short jumpers and making the back of the board more accessible. This arrangement utilized the entire space of the panels giving four feeders to a 3-ft. (91.4-cm.) panel, which before accommodated only two circuits. Furthermore, a more orderly arrangement of switches was secured.

To accomplish reconstruction without cutting out a single feeder, a temporary two-feeder panel was installed and the two feeders from the first panel of the board were connected with it by jumpers. This arrangement cleared one complete panel so that it could be taken down, redrilled and put back in place according to the



ARRANGEMENT OF APPARATUS ON FEEDER BOARD AFTER CAPACITY WAS DOUBLED

rearranged plan. Since the capacity of each panel was doubled by the arrangement, the temporary panel was required only while the first unit was being rebuilt. Thereafter the additional capacity gained by the revised connections took care of each additional unit as it in turn was reconstructed.

The necessity of making the change without inter-

fering with the service made the work consume much more time than would have been ordinarily required. However, the complete reconstruction of the connections was effected in about ten months by one journeyman and a helper. The satisfaction attendant upon the use of the rearranged board is such that the company has adopted this panel arrangement as standard.

ESTIMATED COST OF A 14.5-MILE TELEPHONE LINE

Total and Unit Cost of Equipment, Delivery, Freight and Placing Given in Tabulated Form by New England Company

A comprehensive estimate of the cost of a telephone line as a part of a 66,000-volt transmission service was recently prepared by the Fall River (Mass.) Electric Light Company, which has petitioned the Gas and Electric Light Commission for authority to build a two-circuit steel-tower line from Fall River to the Rhode Island boundary. The estimate was made by engineers of the Turners Falls Power & Electric Company, who have had extended experience in line construction in the Connecticut River valley. The proposed transmission line is 14.5 miles (23.3 km.) in length, and its total cost, including a 1300-ft. (396-m.) span across the Taunton River, is estimated at $294,305. It is planned to install 75-ft. (22.9-m.) Aermotor steel towers spaced 600 ft. (182.9-m.) apart, using two ¼-in. (6.35-mm.) seven-strand steel telephone wires. The total cost of the telephone portion of the line is put at $5,284.45.

DETAILS OF ESTIMATED COST OF TELEPHONE LINE

	Amount Required,	Purchase		Delivery		Freight		Placing		Weight Data, Lb.
		Unit % Ft.	Total	Unit % Lb.	Total	Unit (100 Lb.)	Total	Unit	Total	
¼-in. seven-strand steel wire, ft.	165,186	$0.0925	$1,530.00	$0.30	$49.56	$0.35	$57.82	$6.50 per 1000 ft.	$1,073.71	16,519
No. 2117 insulators	323	0.3876	125.30	0.30	7.85	0.35	9.16	*	.....	2,616.3
No. 9007 Lee pins	309	0.45	139.05	0.30	4.63	0.35	5.41	0.30 ea.	92.70	1,545
No. 1142 insulators	646	1.09	704.14	0.30	27.13	0.35	31.65	0.15 ea.	96.90	9,044
M-218 clamps	617	0.756	466.45	0.30	7.40	0.35	8.64	†	.....	463
No. 5365 hooks	617	0.31	191.27	0.30	1.39	0.35	1.53	†	.....	2,468
¼-in. splicing sleeves	70	0.135	9.45	0.30	0.15	0.35	0.40	‡	.....	50
Transformers, 5-kw	3	48.00	144.00	.....	3.08	.....	3.50	$7.00	21.00	.....
Lightning arresters	3	25.00	75.00	.....	0.22	.....	0.25	¶	.....	.....
Test blocks	8	30.00	240.00	.....	0.66	.....	0.75	$6.00	48.00	.....
Instruments	2	17.50	35.00	.....	1.00	.....	0.30	.....	70.00	.....
Total	.....	.....	$3,659.66	.....	$103.07	.....	$119.41	.....	$1,402.31	.....

*Included with pins. †Included with insulators. ‡Included with wire. ¶Included with transformers.

HOME-MADE BREECHINGS ERECTED IN RECORD TIME

How an Old Steel Stack Was Used as a Temporary Breeching to Save a Complete Failure of Lighting and Heating Service

When the Galesburg (Ill.) Railway, Lighting & Power Company was rebuilding its station the work had reached a point where only the failure of a new breeching to arrive prevented a new battery of boilers being fired up. The settings were dry and the concrete stack was completed. Meanwhile the operating force was engaged in "coaxing" a set of old boilers to produce enough steam to supply electric and steam-heating service. Selecting the coldest night of the winter as the time to cut up, these boilers gave out at midnight.

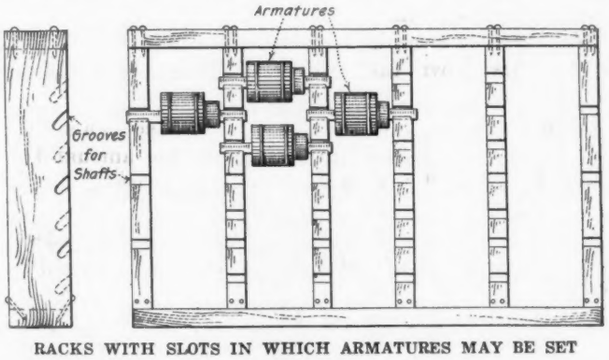
There was no chance to repair them before daylight came with its morning load. The only hope was to get the new battery into service. M. H. Frank, the company's operating superintendent, remembering an old 150-ft. by 8-ft. (45.72-m. by 2.43-m.) steel stack that the company intended to let down and dispose of, took out a crew, cut the stack guys and allowed the steel stack to fall as gently as could be with speed imperative. Only about 20 ft. (6.09 m.) of the steel stack was crushed, and this was straightened enough for practical purposes by jacks placed inside. This steel stack was then hoisted to the position the breeching should occupy and was temporarily connected to the boilers and the stack. The fires, which had already been started under the boilers, were then built up and the boilers were placed on the line in time to pick up the morning load.

SIMPLE ARMATURE RACK

Made of Slotted Planks and Designed to Facilitate the Inspection of Armatures

BY FRANK HARAZIM

Scarred commutators and broken armature wires are often caused by allowing the armatures to be scattered about the workbench after repairs are made. This trouble can be avoided by using a rack which can be constructed from wood as shown in the illustration. The size of the rack will depend upon the length and diameter of the armatures. Three slots are cut in the first and last boards of the rack, and the others contain seven. By keeping armatures in this manner the workbench can be kept more orderly, the armatures may be readily inspected, and there need be no worry about their being misplaced or injured.



RACKS WITH SLOTS IN WHICH ARMATURES MAY BE SET

CENTRAL STATION SERVICE

A Department Devoted to Commercial Policy and Management Topics, Including Applications of Electric Light, Power and Heat

PLAN FOR PROMOTING SALES WITH BONUSES

How the Minneapolis General Electric Company Successfully Worked Out a Salary and Bonus System for Paying Salesmen

A few years ago the sales department of the Minneapolis General Electric Company, organized on the straight salary basis, was running along smoothly with an established force. Then one of the salesmen, who was getting $165 per month, suddenly left the company's employ. His action was responsible for the institution of a bonus system in the company's sales department, for it was decided to give his salary to the men already in the department in the shape of bonuses in the hope that this would stimulate sales.

In the beginning those who were working out the plan took the sales records of all the men in the department over a period of several years. From these records it was found that if an arbitrary value for points was assumed the average man's sales ranged between 2000 points and 5000 points per month. The assumed value, based on a value of forty points for securing a wiring contract in an old house already on the company's line, established a basis from which to figure. The number of points to be credited to a salesman for securing other kinds of business was figured in relation to house-wiring in such a manner that the salesman could not afford to go after business that would come in by itself and would be encouraged to go after business that carried a profit to the company. The same plan was used in arriving at values of points for various items in the commercial lighting business and in the small power business. The result of these calculations is given in the table herewith, which sets forth the number of points credited to each class of business.

With the point system established, it was then necessary to lay down the rules under which the bonus would be given to the salesman. It was decided that the amount of bonus which should be allotted to a salesman should be in direct proportion to the amount by which he reduced his own net sales expense for any certain month over the same month in the preceding year. For instance, if in March, 1916, a certain salesman had a record of 2000 points and his total sales expense was $100, then his sales expense per point would be 5 cents. Then, at the end of March, 1917, if he made a record of 4000 points and his sales expense remained at $100, the cost of his business per point would be 2.5 cents. He would then have reduced his cost of doing business by the amount of 2.5 cents per point, and his bonus for March, 1917, would be 2.5 cents times 4000, the total number of points, or $100. The salesman's total sales expense in each instance was taken as meaning his salary plus his expenses. Expenses were interpreted as being all expense items except such things as civic and commercial club dues and such other items as the company wishes to pay to help promote civic spirit. The equity of the plan was at once apparent to the salesmen, who were in reality given the amount they saved the company.

The plan also works the other way, however, in that a salesman can lose money. He always gets his salary, but if he shows a loss in points which entitles him to a loss of his bonus he must make up the loss in bonus before he can be credited with a cash bonus. Furthermore, a salesman must increase his volume of business before he can be credited with a cash bonus.

Suppose, for example, that in April, 1916, a salesman had a record of 1500 points at a cost of 5 cents per point, and then in April, 1917, he again made a record of 1500 points, but reduced his sales expense to 4 cents a point. This would apparently entitle him to a bonus of $15, but a bonus gained in this manner is good only to apply against a bonus deficit and cannot be collected as a cash bonus.

An important feature of the plan is the reserve fund which has been worked out in connection with the system. Before a salesman can get any bonus he must have a credit of $25 in the reserve fund. After that he can collect every month a bonus amounting to $10 plus 50 per cent of the balance which he may earn. The primary purpose of the reserve is to provide ample credit to absorb any deficit which a salesman may contract in an off month. The secondary reason for the

NUMBER OF POINTS FOR BONUS SYSTEM

Class of Business:	Number of Points
Residence Business	
A. Old house, reconnection contract	1
B. New house, new service on extension	2
C. New house, new service on line	5
D. Old house, new wiring on extension, Ratio ½	10
E. Old house, new wiring on extension, Ratio 1	20
F. Old house, new wiring on line	40
Commercial Light	
G. Old building, reconnection contract, per $100 revenue per year	4
H. New building, new service on extension, per $100 revenue per year	8
I. New building, new service on line, per $100 revenue per year	20
J. Old building, new wiring on extension, per $100 revenue per year	40
K. Additional on meter per $100 revenue per year:	
1. Expansion	20
2. Displacement	50
L. Old building, new wiring on line, per $100 revenue per year	100
Commercial Power	
H. New power on extension per $100 per year	8
I. New power on line per $100 per year	20
K. New power, additional:	
1. Expansion	20
2. Displacement	50
M. Change of name contract (any class of business)	5

reserve is that it provides an accumulation toward the purchase of an automobile. The salesmen are heartily in favor of this plan, because each of them wants a car. To buy the machine it is not necessary for a salesman to wait until his reserve reaches the amount of the purchase price, $382, for the company will buy the car after the salesman's reserve has reached a reasonable amount and will then assist him in paying for it by deducting $10 from his salary and $10 from the bonus which he earns each month.

It is the experience of the Minneapolis company that the last named feature of this plan, which helps the salesmen get cars of their own, is a highly desirable one. It has been found that the salesman with a car cannot only make more money for himself, but can be of greater service to the company.

TACTFUL NOTIFICATION OF RATE ADVANCE TO PATRONS

How a Large Syndicate Informed Its Customers that Increases Were Necessary Because of Higher Costs

Quite frequently public service corporations send out to their customers very formal notices, advising them of changes in service regulations or other matters pertaining to the supply of electrical energy, which have anything but a human appeal. These notices are usually cold and matter of fact, written in a commandeering and authoritative strain and serve many times to arouse animosity against the utility. Especially is this so if advances in rates are announced. In such cases diplomacy of a high order should be employed if friction is to be kept down to a minimum. The accompanying illustration is a reproduction of a notice sent out by one of the syndicates operating from New York which might serve as a model for other utilities, unless something as good or better has already been sent out. It has the advantages of brevity and kindliness without disguising in any degree its purpose.

IT is the earnest desire of this company to render at all times the best possible service at a fair price.

We realize that companies such as ours are absolutely dependent for their success upon the established high quality of the service they render and upon the good will of the public they serve.

Of late, owing to the steadily increasing cost of everything entering into operation and construction—the same as with your own cost of living—costs for rendering good service have steadily mounted upward, until we have been forced to announce to our customers that beginning September first, it will be necessary to make a SERVICE CHARGE OF FIFTY CENTS per month in addition to the amount charged for gas used.

The high cost of living has affected us, far more than it has the average household or business, but even at that, government census figures show that gas and electricity are practically the only things entering into the cost of living that have actually decreased in the past ten years.

During its long period of service, this company has been as liberal as possible in giving voluntary rate reductions thus saving our customers many thousand of dollars. It now asks the indulgence of the public for the necessity of making this nominal service charge which will, in the aggregate tide over the company during the temporary period of excessive production costs.

FORM OF RATE INCREASE NOTIFICATION

POLICE FORCE HIRED TO TURN OUT SIGNS

New Jersey Property Pays 25 Cents a Sign and Finds It More Economical Than Hiring a Special Patrol

The method employed by the Commonwealth Electric Company of Summit, N. J., for rendering service to electric sign customers by turning off their signs at the proper time is inexpensive and full of suggestion. It has been found that to employ patrolmen for the sole purpose of looking after electric signs was very costly. In Summit the company pays the police department of the municipality 25 cents per month per sign for turning off signs at the proper time. This is much cheaper than the cost of hiring a patrolman for this work. The signs have outside boxes, locked, with one master key fitting all. All that the policeman has to do is to unlock the box and turn off the switch. For turning on these lights the company employs a man, who also notes lamp outages, which he immediately remedies. The company uses a flat rate for lamps for sign purposes based on the number of lamps required.

ELECTRIC WATER HEATING WITH RANGE INSTALLATION

Outline of Practice Followed by Southern California Company and Which Has Met with Considerable Approval on Part of Customers

In a paper read before a meeting of the employees of the enlarged Southern California Edison Company, Los Angeles, Charles H. Coulter made the following remarks regarding electric water heating:

Heating water is a phase of our business that has received little consideration from central stations up to the present time, because of the opinion that it would be necessary to give a decidedly low rate to obtain this business. At the present time we have two styles of water heaters to offer the prospective consumer—the circulating type of 3 kw. to 4 kw. rating and the submerged-tank type, a heater taking from 800 watts to 1500 watts.

It is my opinion that serious consideration should be given the type of heater that we recommend for sale. The circulating type has its advantages, and the installation of this heater through the farming districts may not seriously interfere with our service and may call for only a slight increase in our transformer expense. This heater gives the consumer the advantage of being able to heat and draw from the top of the tank just as little hot water as desired. It is fast—within twenty minutes one may have sufficient water for a bath. It may be quickly installed. Care must be exercised, however, in not trapping the hot water when the discharge is placed on the top of the tank. We have found it advisable to enter the tank on the side as near the top as possible. Nearly all tanks used for domestic hot water are tapped, so that the discharge outlet may be connected in this way.

For insulation—a very important part of any satisfactory hot-water system, and particularly so where electricity is used—we have been using "Cel-o-cel." In almost every new home you will find the water tank has been boxed. We have taken advantage of this condition by closing the lower end of the space and boxing the tank with this insulator.

The circulating type may be easily cleaned when the efficiency of the heater is affected by scale. This type has the advantages of low initial cost, of being easily cleaned when affected by scale and of giving the consumer the privilege of heating as little water as needed, thereby keeping the cost of this necessity to the figure he is willing to pay, and the disadvantage of causing our company a lot of

SIDE GUIDE & GRIPPER

trouble if promiscuously installed within the more thickly populated districts.

The submerged type gives hot water at all hours at any degree desired. The thermostatic control is reliable, and the element of one particular heater of this type is so constructed that trouble caused from scale may be easily taken care of. The use of the submerged-type low-water wattage heater in conjunction with an electric range gives the consumer an installation to-day that will eventually be used as widely as gas at the present time.

Within the Van Nuys district we have installed twenty-seven heaters, and I can conscientiously say that we have not had one complaint caused by a high bill brought about by the use of the heater. In a number of instances we had numerous and serious complaints caused by high bills where a range was installed and a water heater not used. Because we believed that these consumers were heating considerable water on the outside elements of the electric ranges, we recommended the installation of a heater. After the installation of the water heaters the consumers are, without one exception, satisfied with their ranges.

PREVENTION OF FOOD WASTE BY MEANS OF DEHYDRATION

Opportunity for Central Stations to Serve the Nation by Showing Customers How Electric Fans Can Be Used to Dry Vegetables and Fruits

Prevention of food waste is now the national slogan, and the electric lighting utilities have it in their power to further this propaganda. The opportunity lies

Drying Fruits and Vegetables
A New Use for the Electric FAN
Outlining a Campaign for Selling Electric Fans and Building Up the Fan Load
The U. S. Department of Agriculture, Bulletin No. 841, says:
"It has been found that many sliced vegetables and fruits placed in long trays 3 by 1 foot and stacked in two tiers end to end before an Electric Fan can be dried to the requisite dryness within 24 hours. Some require much less time. For instance, sliced string beans and shredded sweet potatoes will dry before a fan running at a moderate speed within a few hours. In many cities the Electric Fan will cost not more than one-fourth of a cent an hour to run. The Fan should be placed close to the stacks of trays, and they should not be filled so full that the air can not pass freely through them. The Fan method has a marked advantage in that product keeps cool owing to evaporation while it is being dried, thus tending to retain the color and eliminate spoilage."
Write to the Division of Publications, Dept. of Agriculture, Washington, D. C. and you will receive a complete copy of this Bulletin. (No. 841) free.

ADVERTISING ONE OF THE ELECTRIC FAN'S VARIED USES

through dehydration by means of the electric fan. The electric fan is purchased as a rule only for use in the hot summer months, although it is well known in the industry that its range of operation covers a much longer period. Now is an opportunity to point out to customers having fans how the fans can be used to dehydrate vegetables and thereby serve the nation. It might be pointed out that a strenuous campaign in this direction by the central station companies might derive a profitable reward from the energy consumed by the fans.

The Society for Electrical Development has recently issued a pamphlet describing the electric fan process for drying fruit and vegetables and showing the central stations typical advertisements for promoting this work. Considerable interest is being aroused by a window display of the Glenwood Light & Water Company of Glenwood Springs, Col., in which fruit and vegetables are dried by an electric fan. Four racks made of light wood with wire mesh bottoms are set up in front of a 10-in (25.4-cm.) Westinghouse fan. Each rack is large enough for 6 quarts (5.6 l.) of material. A watt-hour meter indicates the exact cost for each run. In an advertisement in the local papers the company asks housewives to bring their fruits and vegetables and have them dried free of charge. Reference is made to Farmer's Bulletin No. 841, which describes the process.

PLAN FOR APPORTIONMENT OF LINE COST TO CUSTOMERS

In Cases Where Construction Investment Is Not Justified Customers Are So Assessed That Each Pays for Part of Line He Uses

In its construction of distribution lines which will serve only isolated consumers, the Louisville Gas & Electric Company, as is customary where prospective business would not justify construction investments, requires the customers to defray construction costs of this new work. Where only one customer is involved the plan is simple, but where others are interested this company has worked out a plan for apportionment of the costs which is proving satisfactory to the customers.

An instance of this kind recently came to the attention of a representative of the ELECTRICAL WORLD. The line was extended out into a district occupied by country homes of well-to-do people living at some distance from their neighbors. Six of them wanted service that entailed nearly 2 miles (3.2 km.) of wire construction, about a fifth of which reached the place of the first customer. Instead of assessing each customer a sixth of the whole cost, the Louisville company charged the nearest consumer only one-sixth of the cost of the construction to him. The next five each paid an equal amount plus one-fifth of the cost from that point to reach the second man, and so on until the sixth man paid his one-sixth of the cost to the first man, one-fifth of the second step, one-fourth of the third step, one-third of the fourth, one-half of the fifth, and the whole of the last division. In this way each customer paid for the line he actually uses an amount equal to that paid by all others who use that same part of the line. Where the line goes beyond a customer he does not participate in paying for the part he does not use.

This plan has recommended itself to the customers concerned and has become the established practice of the Louisville company.

ADVANCE IN TECHNICAL THEORY AND PRACTICE

Including a Digest of Important Articles Appearing in the Scientific and Engineering Press of the World

DETERMINING PHASE-LAG IN CURRENT TRANSFORMERS

Methods Described That Are Simple to Carry Out and Capable of Giving Required Results Rapidly Under Commercial Conditions

THE importance of determining the exact ratio of transformation of current transformers and the phase-lag introduced by their insertion between the main circuit and the windings of meters had led a number of experimenters to develop a variety of methods of measurement of these quantities. A. J. Makower and A. Wust in the July 13 issue of the London *Electrician* describe methods that are simple to carry out and capable of giving the required results rapidly under commercial conditions.

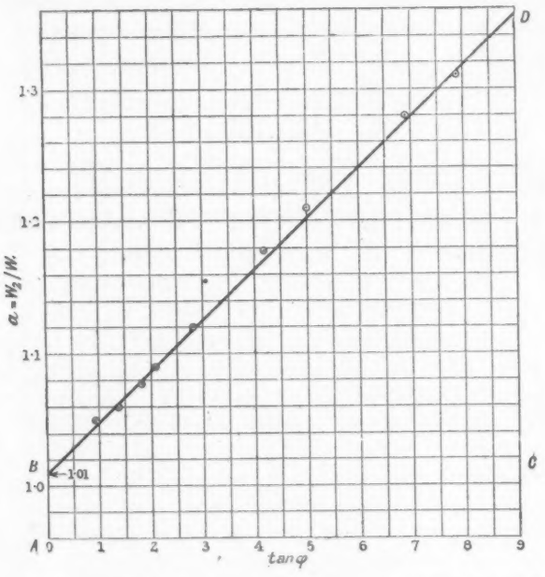


FIG. 1—RELATION OF TANGENT OF PHASE ANGLE TO RATIO BETWEEN WATTMETER READINGS

If two wattmeters, W_1 and W_2, the latter with a transformer, are connected with their shunt coils in parallel across the terminals of an alternator, A_1, whose voltage is E, and with their secondaries so as to carry the currents I_1 and I_2 supplied by the coupled alternators A_1 and A_2, the readings of the instruments are given by the equations

$$W_1 = EI_1 \cos \varphi \qquad (1)$$

$$W_2 = EI_2 \cos (\varphi + \delta) \qquad (2)$$

where I_1 and I_2 are the primary and secondary currents of the transformer T under test and δ is the angle of lag introduced by it. The angle φ between the voltage E and the current I_1 can be varied at will by altering the coupling angle between the alternators by means of the adjustable coupling B. If the ratio of transformation of the transformer is given by $\lambda = I_2/I_1$, and the ratio of the wattmeter readings by $a = W_2/W_1$, it follows that

$$a = \lambda (\cos \delta - \sin \delta \tan \varphi) \qquad (3)$$

If any two points a_1 and a_2 are taken at angles φ_1 and φ_2 from the curve given by $a = f(\varphi)$, it can be shown that

$$\tan \delta = \frac{a_1 - a_2}{a_2 \tan \varphi_1 - a_1 \tan \varphi_2}. \qquad (4)$$

The value of δ can be calculated from equation (4), taking several pairs of values, and the value of λ is then obtainable by substituting in equation (3) the mean value obtained for δ.

This method was applied to a pair of similar current-transformers of a commercial type, whose rating was 75/3.5 amp. at 25/125 cycles. Transformers T_1 and T_2 were connected back to back in the position occupied by the transformer T. By this arrangement wattmeters W_1 and W_2 of the same range could be used.

If the nominal ratio of transformation of each of the transformers be called t, the nominal ratio of the combination will be $t/t = 1$. The actual ratios of transformation are λt and $\frac{1}{t}\lambda$, giving an actual combined ratio of transformation of λ^2, which we will call Λ. If the angle of lag introduced by each transformer is δ, the angle of lag introduced by the combination may be written as $\Delta = 2\delta$.

The observed curve $a = f(\varphi)$ is plotted in Fig. 2.

From this curve Δ and Λ can be calculated as explained above, using equations (3) and (4), but it is preferable to obtain these quantities graphically by plotting the curve $a = f(\tan \varphi)$. This is shown in Fig. 1, from which we see that $AB = \Lambda \cos \Delta$ and $-\tan CBD = \Lambda \sin \Delta$. Inserting the particular values we have

$$\Lambda \cos \Delta = 1.01,$$

$$\Lambda \sin \Delta = -0.0383,$$

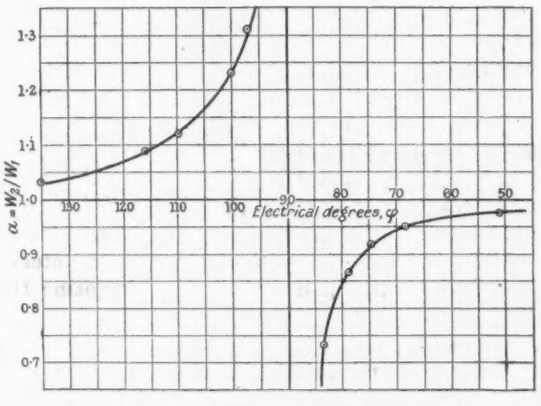


FIG. 2—OBSERVATIONS MADE WITH TWO COMMERCIAL CURRENT TRANSFORMERS

whence

$$\Delta = -2°10' \text{ and } \Lambda = 0.983,$$

giving

$$\delta = -1°5' \text{ and } \lambda = 0.993.$$

While the forms of the curves obtained are of general interest, their determination involves considerable time and careful calibration of the two wattmeters in order to get correct values of the quantity α. The tests can be greatly simplified if the value of δ alone is sought and the wattmeters are used only as zero reading instruments.

Installations, Systems and Appliances

An Electrical Method of Hardening Steel.—A method known as the Wild-Barfield process, which has recently been developed and put into practical use, is described. The process, in so far as it involves the heating of the steel up to a certain point, and quenching it, entails no departure from accepted practice. Its chief claim to distinction may be said to lie in the manner in which the attainment of the correct temperature from which to quench the steel is judged. The furnace consists of a cylindrical vessel of heat-insulating material, containing a lining of special composition. Within the lining there is embedded an electrical heating coil, which in use is supplied with direct current. The temperature inside the furnace may reach 850 to 870 deg. C., and is measured by means of a thermocouple. It is not of material importance, however, what precisely the furnace temperature is so long as it is above the temperature from which the steel to be hardened should be quenched. This temperature is that of the decalescence point of the steel in question, and varies from steel to steel. It may be said, however, in general to be round about 750 deg. C. The procedure then is simply to suspend the gage or other body within the furnace until it reaches the decalescence point, and thereupon to remove and quench it. The chief novelty of the process lies in the means adopted for determining when the steel reaches its decalescence point. These means take advantage of the known phenomenon that steel ceases to be magnetic at and above the decalescence point. The heating coil, embedded in the furnace lining, behaves as a solenoid and radiates magnetic flux. As is well known, the magnetic flux from a solenoid is increased by inserting within the coil a core of magnetic metal such as steel or iron. In the ordinary case the coil of an electromagnet is wound closely around the metallic core. In the present instance the core is the gage or other body to be hardened, and is separated from the coil by an intervening space—filled with liquid salt—and the inclosing furnace lining. This reduces but does not wholly suppress the influence of the core as regards the increase of the magnetic flux from the solenoid heating coil.—London *Engineering*, July 27, 1917.

Theoretical Consideration of the Ventilation of Substations and Transformer Houses.—T. H. WOOD.—Although this subject is a highly important factor in the design of substations it does not always receive the consideration which it deserves, especially as the results obtained by theory agree so well with the conditions that are sure to be found in well-designed substations. Between the two modes of ventilation (mechanical and natural) it is impossible to fix any hard and fast rule, as each has its own particular advantages, and local conditions must always be the deciding factor. Natural ventilation has the great advantage of utilizing the heat derived from the energy losses of the plant, so that the running cost is nil and the initial cost of the louver ventilators is not excessive. A common form of construction is to have them about 2 ft. (0.6 m.) high, running the length of the roof. The disadvantage of the louver type is that it is not easy to vary the ventilating area, so that on light load in winter the substation gets very cold. This can be remedied to a certain extent by employing a double row of windows, made to open and close as desired and arranged in the form of a roof lantern, thereby serving the double purpose of lighting the center of the building and providing space for a propeller fan fitted in a circular hole near the roof, the chief advantage being the much-reduced ventilating area required. If it is fitted in the gable end, it can often be made to assist in the architectural design of the building, but the running cost must not be overlooked. The author also gives calculations which take into account only the total plant which is likely to be running at one time and at its rated capacity.—London *Elec. Review*, July 20, 1917.

Generation, Transmission and Distribution

The Use of Waste Gases for Steam Generation.—JOHN B. C. KERSHAW.—In view of the industrial struggles ahead and the existing need for utilizing fuel resources to the greatest possible extent, the author has made a study of the progress and records of the last few years, in order to show what economies are possible by aid of waste-heat boilers. He points out that the heat carried away in waste gases may exist either as "sensible heat," *i.e.*, heat measurable by the thermometer and due to the failure to extract from the gases the whole of the heat generated by the combustion of the fuel, or as "potential heat," *i.e.*, heat represented by chemical energy, due to the incomplete oxidation of the combustible matter and to the presence of hydrogen and carbonic oxide in the escaping gases. In the latter case, the author says, some form of burner and combustion chamber, with means for regulating the air supply, is necessary, whereas when the waste gases carry only "sensible" heat and combustion is completed, the addition of a boiler only is required to save some portion of wasted heat. He further points out that in the earlier installations of waste-heat boilers the natural chimney draft was relied upon to overcome the increased resistance due to the passage of the gases through the flues of the boiler. In many cases the boiler was erected directly above the furnace, so as to minimize the losses from this cause. This plan was never entirely satisfactory, and in modern installations artificial draft is always employed. In this way the draft of the original apparatus or furnace is increased rather than lessened by the installation of the waste heat boilers, and the use of the fans also enables much higher gas velocities to be attained over the water-cooled plates of the boiler, and increases considerably the rate of heat transmission and therefore the efficiency of the whole plant. As regards the practical value of waste heat boilers it is possible with a modern plant to reduce the heat of the waste gases to 500 deg. Fahr. (260 deg. C.). Any furnace, therefore, which is allowing gases to pass away above this temperature may be provided with the necessary plant for recovering the waste heat, although

as a general rule it only pays to recover the heat when the gases are carrying 200 deg. or 300 deg. Fahr. (93.3 deg. or 148.9 deg. C.) of surplus heat up the chimney. Practical examples of waste-heat utilization for steam generation are drawn from the United Kingdom, Belgium, Germany and the United States, examples being selected in which the data of test results are the most reliable and up to date.—London *Engineering*, July 20, 1917.

Electric Steel Furnaces.—E. KILBURN SCOTT.—In this article the author describes the various types of furnaces used in England, specially emphasizing a description of the Greaves-Etchells furnace. He also points out that very soon there will be fifty electric furnaces at once in the Sheffield district and the output of the field will be at the rate of 200,000 tons (181,400 t.) per annum.—London *Elec. Review*, July 13, 1917.

Units, Measurements and Instruments

Testing of Magneto Magnets.—J. D. MORGAN.—The author in this article points out that the testing of the permanent magnets used in ignition magnetos, though apparently a simple matter, presents difficulties of both a scientific and a practical nature. He describes a magnetic balance suited to practical conditions of testing and related in its action as nearly as possible to the duty which the magnet is required to perform.—London *Engineering*, July 13, 1917.

Miscellaneous

Hydroelectric Energy in Spain.—According to recent statistics, the hydroelectric energy available in Spain amounts to 5,000,000 kw. There are in being 110 great hydroelectric installations, which produce a total of 280,000 kw., and a large number of small manufactories, of which the production is 500,000 kw. The reserve power of the 110 large installations is about 1,000,000 kw. Many factories use water as motive power without transforming it into electricity. In Catalonia the weaving industry uses power equivalent to about 200,000 kw., of which half is used directly. The rivers which have their source in the Pyrenees and traverse Catalonia could furnish more than 1,000,000 kw., but the concessions granted amount to only 600,000 kw. The unused water-power should be a factor in the industrial development of Spain.—*L'Industrie Elec.*, July 25, 1917.

Book Review

ELECTRICAL METERS. Second edition. By Cyril M. Jansky. Prepared in the extension division of the University of Wisconsin. New York: McGraw-Hill Book Company, Inc. 416 pages, 315 illustrations. Price, $3 net.

Though the title may give the impression that this book deals only with what is popularly understood by the term "meters"—namely, those of the integrating kind—it includes also quite a treatise on what are generally termed measuring instruments, that is, those which indicate but do not integrate, though this portion is chiefly introductory to the other in being devoted more particularly to those types of indicating instruments which are used in the integrating ones. As a book on integrating meters it therefore is complete in itself and treats quite thoroughly of a subject which is generally only a mere chapter in books of broader scope; it is, in fact, believed to be the only book devoted entirely to this subject. The author has wisely made it still more complete in itself by including a well-written chapter on those of the fundamental principles of electricity and magnetism which are involved in an intelligent understanding of meters, including a good brief discussion of terms, units, laws, alternating currents and induction. The main part of the book is devoted to a description, with numerous well-chosen illustrations, of the various typical American meters used in practice, and to a considerable extent to the method of testing them, including a chapter on the errors and their causes. It treats not only of watt-hour and ampere-hour meters of the integrating types, but also of many forms of indicating meters, including those for measuring volts, amperes, power, phase and frequency, as also recording and demand meters and instrument transformers, making the treatise one which covers the subject with considerable completeness. The explanations are in simple and easily understood terms, accompanied by numerous diagrams, and there is very little of the higher mathematics. The author, in the capacity of a teacher, has made a specialty of familiarizing himself with this class of instruments and with testing them; he is therefore well qualified in this branch and gives the reader the advantages of his own apparently very extended experience, especially in meter testing. The book is therefore not one of the "shears and paste" variety. During the four years since the first edition appeared many new developments have been made, hence much new material has been added and obsolescent matter has been cut out. The chapter on the errors of instruments has been largely rewritten and information on the influence of frequency and wave form has been added, as also a whole chapter on instrument transformers. Among minor features which might be criticised, mention may be made of the fact that the author refers to Ohm's law before he describes it; that when he describes it he does not put it into its more usual form, $I = E/R$; that he does not lay sufficient stress on valence in connection with Faraday's law; that the energy of water is better represented by pounds and feet than by cubic feet and feet; that an emf. is not always produced by a change of linkages of magnetic flux; that a kilowatt-hour is not necessarily 1000 watts for one hour, etc. But these slips are not likely seriously to confuse the average reader. A more definite distinction between direct-current and alternating-current instruments would have increased the reference value of the book, though it is true that the two kinds overlap. The book, which is complete in itself, is a useful one, is well and intelligently prepared, showing a familiarity with the subject, and is said to be the only one devoted entirely to this branch of applied electricity.

Books Received

ELECTRICAL MACHINERY. By Terrell Croft. New York: McGraw-Hill Book Company, Inc. 318 pages, 302 illustrations. Price, $2 net.

STANDARD TABLE OF ELECTROCHEMICAL EQUIVALENTS AND THEIR DERIVATIVES. By Carl Hering and Frederick H. Getman. New York: D. Van Nostrand Company. 130 pages, illustrated. Price, $2.

NEWS OF THE INDUSTRY

Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields

WISCONSIN PURCHASE BY INSULL INTERESTS

John I. Beggs Advises Electrical World of New Holding Company in Which Mr. Insull and Associates Acquire Stock

A telegram from John I. Beggs, president Wisconsin Power, Heat & Light Company, was received in answer to an inquiry by the ELECTRICAL WORLD. It did not reach New York until after the issue of last week had gone to press. The telegram supplements the article in that issue, page 315, in regard to the transaction by which Samuel Insull and associates acquire an interest in properties developed by Mr. Beggs. The message is as follows:

Have not sold any electrical properties or stocks. Insull and associates have bought large interest in additional stock issue Central Utilities Securities Corporation, which is a holding company controlling certain hydroelectric and public utilities in Wisconsin and which has acquired recently large oil interests in Illinois. I retain my entire interest in the company and continue as a director thereof. The properties in the Fox River Valley controlled by me are not included or involved or in any way affected by these negotiations, the ownership, administration and management of them remaining in my hands.

SPECIALIZATION IN ARMY SAVES MEN AND MATERIALS

Captain Capart Calls Attention to Necessity of Employing Each Soldier of Industrial Training in His Own Trade

Supplementing the interview published in the ELECTRICAL WORLD of Aug. 11, 1917, page 271, Capt. Gustave P. Capart of the general staff of General Pétain, who is now in the United States as a member of the French scientific commission, writes to call attention to several special points which should be of great interest to American engineers. Captain Capart says:

The first of the points to which I refer is the necessity which has been encountered by all of the belligerent armies of establishing the separate identities of the forces in the trenches and those to the rear.

The first of these army service corps, of course, are in contact with the enemy, and the others must prepare defensive works and provide with munitions and supplies their comrades in the trenches by means of railroads, roads, automobiles and all other methods of transport. They must repair the means of transport, maintain machine shops, operate water-supply systems, etc.

The second point, and one which it is of the greatest importance that American engineers shall grasp, as they will, since it coincides with their every-day experience in civil life, is the indispensability of specialization in the army. In order to attain the greatest human efficiency and thereby the greatest efficiency in material and the least loss in human life it is necessary that in so far as may be possible each soldier of industrial training be employed in his own trade. This makes it possible to organize entire and individualized regiments of electricians, of foresters, of concrete workers, etc., who become available for active duty very quickly, as their military training may be extremely limited.

By thus pushing to the limit that intense specialization the necessity for which is being realized more and more in Europe the United States will be able to lend prompt and efficacious aid to her allies. That the American authorities are working in this general direction is shown by the formation of railway regiments which are already in France and the foresters' regiments now in course of organization. It is not only in the forces to the rear that this specialization is noted; the actual fighting forces are divided into sections of bombers, machine-gun operators, trench-mortar operators, etc. The public is already familiar with the highly specialized airplane service, which may be pointed to as an example.

Finally, I should like to call your attention to the fact that the game of war cannot be learned once for all. Each soldier of whatever corps must serve actively, have a period of rest and a period of training in special schools in the newer phases of the ever-changing business of war. The engineer in civil life finds it necessary to read constantly, to converse with his fellow engineers, see new developments, etc., in order to keep up to date. War is the greatest enterprise ever undertaken, and no one is permitted to go to sleep on the job. The mentally "dead one" becomes so literally if not sooner discarded.

LOW-RATE ENERGY CASE OF CALIFORNIA COMPANIES

Pacific Electro Metals Hearing Before Railroad Commission Involves Questions of Cost and Rate Making

The investigation which the California Railroad Commission is making on its own initiative into the rates which three San Francisco power companies are quoting the Pacific Electro Metals Company occupied four full days last week and involved long processes of direct and cross-examination. Among those called to the stand were Mortimer Fleishhacker, president Great Western Power Company; John A. Britton, vice-president and general manager Pacific Gas & Electric Company, and H. F. Jackson, president Sierra & San Francisco Power Company, as well as engineers and rate experts of these companies. A statement of the case appeared in the ELECTRICAL WORLD for July 28, page 175.

The most essential points of the case have not been reached, but a formidable collection of statistics has been prepared and there is general agreement on the importance of the rate-making principles involved. After examination of the power company officials the commission will present the results of its study. This will be accompanied by a map showing transmission lines of the State and suggesting means of combination to cut down cost of service, reduce steam standby charges and conserve power resources generally.

Meanwhile construction is actively under way on the Pacific Electro Metals plant at Bay Point. One of the structures is partly completed and concrete footings for several others have been poured.

PRESIDENT WILSON FIXES COAL PRICES

The following scale of prices is prescribed for bituminous coal at the mine in the several producing districts. It is provisional only. It is subject to reconsideration when the whole method of administering the fuel supplies of the country shall have been satisfactorily organized and put into operation.

Subsequent measures will have as their object a fair and equitable control of the distribution of the supply and of the prices, not only at the mines, but also in the hands of the middlemen and the retailers.

The prices provisionally fixed here are fixed by my authority under the provisions of the recent act of Congress regarding administration of the food supply of the country, which also conferred upon the Executive control of the fuel supply. They are based upon the actual cost of production and are deemed to be not only fair and just, but liberal as well. Under them the industry should nowhere lack stimulation.—*From the President's Statement.*

The prices prescribed, being on f. o. b. mine basis for tons of 2000 lb., follow:

	Run of Mine	Prepared Sizes	Slack or Screenings
Pennsylvania	$2.00	$2.25	$1.75
Maryland	2.00	2.25	1.75
West Virginia	2.00	2.25	1.75
West Virginia (New River)	2.15	2.40	1.90
Virginia	2.00	2.25	1.75
Ohio (thick vein)	2.00	2.25	1.75
Ohio (thin vein)	2.35	2.60	2.10
Kentucky	1.95	2.20	1.70
Kentucky (Jellico)	2.40	2.65	2.15
Alabama (big seam)	1.90	2.15	1.65
Alabama (Pratt, Jaeger and Corona)	2.15	2.40	1.90
Alabama (Cahaba and Black Creek)	2.40	2.65	2.15
Tennessee (eastern)	2.30	2.55	2.05
Tennessee (Jellico)	2.40	2.65	2.15
Indiana	1.95	2.20	1.70
Illinois	1.95	2.20	1.70
Illinois (third vein)	2.40	2.65	2.15
Arkansas	2.65	2.90	2.40
Iowa	2.70	2.95	2.45
Kansas	2.55	2.80	2.30
Missouri	2.70	2.95	2.45
Oklahoma	3.05	3.30	2.80
Texas	2.65	2.90	2.40
Colorado	2.45	2.70	2.20
Montana	2.70	2.95	2.45
New Mexico	2.40	2.65	2.15
Wyoming	2.50	2.75	2.25
Utah	2.60	2.85	2.35
Washington	3.25	3.50	3.00

MORE SERVICE FROM THE FREIGHT CARS

Intensive Car Loading and Increase in Number of Miles Hauled Contribute Toward a Better Showing

Fairfax Harrison, chairman of the Railroads' War Board, authorizes the following:

With an increase in equipment of only 3 per cent, the railroads of this country rendered nearly 26 per cent more freight service in June than in the same month last year.

Both the railroad men and the shippers are to be congratulated on the zeal and skill with which they have carried out the requests of the Railroads' War Board "to make one car do the work of two." Intensive loading has increased the number of cars available to meet the demands of the government and the shipping public by many thousands. Prompt loading and unloading of cars and the efforts which the railroad employees are making to keep cars out of the repair shops have also done much to help.

IMPROVEMENT COMES IN CONDITIONS OF COAL SUPPLY

Coal Production Committee of Council of National Defense Says, However, That Production Does Not Meet Increased Requirements

An appeal to coal operators and miners issued by the coal production committee of the Advisory Council of National Defense, and signed by F. S. Peabody, chairman, and William Green, secretary, says in part:

The coal production has been increasing sufficiently to warrant the belief that there will be an adequate supply of coal to meet the requirements of consumers in the United States. The bituminous coal loaded at the mines in May was 24 per cent more than in May a year ago and 12 per cent more than in April of this year. In June, 1917, the increase was 26 per cent above the output of June, 1916. This means that in June, 1917, a new record was established, with a production of nearly 47,000,000 tons (42,300,000 t.) of bituminous coal. This gratifying record was even exceeded in July. Yet not enough coal is being mined to meet the increased requirements, estimated at 10,000,000 tons (9,000,000 t.) annually, which will be necessary to supply the growing needs of our allies, for the bunkering of fleets which will transport our troops and supplies to France, and for Cuba and South America.

Though the production of coal throughout the country is now seriously handicapped by the inadequacy of transportation facilities, yet we call attention to the fact that, owing to the co-operation and the splendid efforts of the executive railway committee of the Council of National Defense, much progress has been made in supplying cars to the mines, resulting in the material increase in production for the month of May over that of April. There is, of course, still room for improvement, but we have every assurance that the regulations now being put into effect by the railroads, the putting into service of many new cars and the increase of motive power as a result of the curtailment in passenger service will make for a continued improvement in car supply.

It is not the intention of this committee to seek arbitrarily to restrict the normal activities of operators or miners, but we are interested, as the whole nation must be, in maintaining uninterrupted operation in the coal-mining industry and in securing at all times the maximum production of coal. This committee, representing the coal operators and miners, renders great service in promoting good will and harmony in the coal industry and in co-operating for the purpose of bringing about the adjustment of differences between operators and miners to the end that production may be increased.

The present co-operation between those actively engaged in the conduct of the coal industry will prevent the putting into effect of any extreme or arbitrary policy which would interfere with the freedom of action of the coal operators and coal miners of the country. In the judgment of the committee the problems affecting this industry can be more effectively solved and the interest of our nation and the public more properly protected by the men who, from the nature of their business and occupation, are essentially qualified to deal with them. It is necessary that a proper degree of voluntary restraint be exercised to the end that not only the maximum production be obtained, but that the public may be able to rest secure in the knowledge that its interest will be safeguarded.

Ernest Haughton and Wife Killed in Automobile Accident

Ernest Haughton, manager of the Chicago Bryan-Marsh division of the National Lamp Works, was killed, with Mrs. Haughton, Wednesday night, Aug. 22, while driving by automobile from Association Island to Paul Smith's in the Adirondacks. According to obtainable meager reports, none of the children was injured.

SOUTHERN CENTRAL STATION MEN DISCUSS RANGE SALES

Peculiar Selling Problems of Virginia and Carolina Companies Threshed Out in Meeting Held in Richmond

Because the colored servant adds peculiar difficulties to the electric range sales problem in the Southeastern States, fifty central station men from that section gathered at the Hotel Jefferson, Richmond, Va., on Aug. 17, to exchange experiences and arrange for closer co-operation in the development of this class of business. The meeting was called by a committee headed by A. H. Grimsley, general manager Virginia Western Power Company, Clifton Forge, Va. The program was as follows:

"The Basis of a Cooking Rate," P. L. Miles, Hughes Electric Heating Company, Chicago.

"Selling Electric Ranges in Small Southern Towns," E. G. Couch, Carolina Power & Light Company, Raleigh, N. C.

"Demonstrating the Range in the Customer's Kitchen," Mrs. P. L. Miles.

"Selling One Hundred Ranges in a Town of Two Thousand," C. E. Romedy, local manager Carolina Gas & Electric Company, Darlington, S. C.

"Developing Customers," William Lancaster, Western Electric Company, Richmond.

"Selling the Range to Yourself," Frank B. Rae, Jr., *Electrical Merchandising*, New York.

In addition to the formal program, H. W. Alexander, Society of Electrical Development, New York, and C. A. McGee, Consolidated Gas, Electric Light & Power Company, Baltimore, made brief addresses.

COLORED SERVANTS NO SERIOUS OBSTACLE

The colored servant constitutes an exaggerated and largely imaginary obstacle to range sales, according to Mr. Couch. He declared that these servants are being taught to operate electric ranges successfully and economically in the towns which his company serves. The most effective means he has found for accomplishing this education is a course of lessons which, when completed, entitles the cook to a diploma elaborately engraved and embellished with a large gold seal and red ribbon. The servants are very proud of these diplomas, which are framed and hung in the kitchens to the envy of less fortunate servants of the community.

A rate of 1¼ cents per kilowatt-hour for water heating was advocated by Mr. Grimsley, who had submitted such a rate to the utilities commissions of Virginia and West Virginia. By experiments extending over a period of more than two years, his company established the fact that the average family in the South can have an ample supply of warm and hot water at an expenditure of from 175 kw.-hr. to 225 kw.-hr. per month. He recommended the use of a three-point type of heater, the maximum consumption of which is 750 watts and the minimum 167 watts. By leaving the low heat on through the night, a 40-gal. (151.4-l.) insulated boiler is kept always warm and requires only an occasional "boost" on the high heat to give as much hot water as is required. A double-throw switch prevents the water heater from being used at the same time as the electric range, and a clause in the customer's contract prohibits its use during the evening peak.

In justifying this rate to the utilities commissions, Mr. Grimsley advanced the argument that 1¼ cents constituted a secondary rate. Energy for water heating is supplied only in connection with electric cooking, for which he makes a rate of $1 per kilowatt of demand and 3 cents per kilowatt-hour.

Several of those attending the meeting expressed themselves as being "on the fence" in the matter of making a cooking rate. Those who had experience claimed that because of the diversity factor of this load, its tendency not to add more than 10 per cent to the station peak and its undoubted advantage in filling load valleys, the business justified a rate of approximately 3 cents and that such a rate would net a profit equal to or greater than ordinary lighting business after a reasonable degree of range saturation is secured.

Mr. Miles closed the meeting with a complete outline of electric range selling campaign methods which had proved successful in meeting conditions in the South.

Upon invitation of W. H. Hall, manager, the new building of the Western Electric Company was visited and a buffet luncheon served.

HIGHER COST AND RATE PROBLEM IN HYNDMAN, PA.

President Margraff Feels Injustice of Present Fuel Prices and Danger to Industries and Economic Conditions

John D. Margraff, president and general manager of the Hyndman (Pa.) Electric Light, Heat & Power Company, writes in reply to an inquiry from the ELECTRICAL WORLD that the proposed increase in rates of his company does not begin to cover the additional cost "due to the inflated and unfair prices of coal." Mr. Margraff adds that the indications are that miners received an advance in wages of about 60 per cent, while the price of coal was advanced over 300 per cent. Nor is there any indication that coal operators had their overhead charges increased, for they are operating practically on the same scale with the same machinery which they used when coal was selling at $1 per ton at the mines. The present quotation is $3.50 per ton for run-of-mine coal at the mine.

SMALL INDUSTRIES WILL BE AFFECTED

Mr. Margraff says that the country is filled with numerous small industries which are the very sinew of the nation, and that with coal at $3 to $5 per ton they cannot exist but will have to discontinue, because fuel is too high compared with the prices which they are receiving for their own products.

It is the belief of Mr. Margraff that present conditions, if continued, will breed fuel famine and discontent in the coming winter.

In notifying the public that the Pennsylvania Public Service Commission had been asked to approve an advance, the Hyndman company said:

Below we give you an approximate estimate of the increased cost of operation which we believe will readily convince you that the advance asked for is very small as compared to the added cost of material and is justifiable on our part:

Coal (which is our basic expense) advanced over 200 per cent, copper 40 per cent, material for repairs 50 per cent, and wages of employees advanced 20 per cent.

The above will give you a fair idea of the increased cost of operation; the advance applied for does not begin to compare with the added cost of material.

SHORTAGE OF POWER RAISES A PROBLEM

Rochester Company Affected by Labor and Material Shortage and Decrease in Niagara Service—Kansas City Situation

Shortage of power is reported in various cities. Arrangements are being made to lessen the resulting inconvenience as much as possible and to increase capacity so as to take care of the enormously increased demands for energy for industrial purposes. Statements in regard to the situation in Rochester, N. Y., and Kansas City, Mo., are published herewith.

Reasons for Rochester Difficulties

James T. Hutchings, vice-president and general manager Rochester Railway & Light Company, issued the following statement on Aug. 10:

The various statements which have appeared in the papers in regard to the failure of power on Thursday morning for an hour and twenty minutes and the slight interruption in power supplied to certain lines of the street railway company at about 5 o'clock in the afternoon were in detail correct, but did not give a complete statement of the situation and all which led up to it.

The demand for power not only for the street railway but also for manufacturing purposes in Rochester has been very excessive, owing to the tremendous industrial activities brought on us by the war and particularly since the entrance of this country. The Railway & Light Company management appreciated fully the possibility of this demand and more than a year ago entered into contracts for materials and supplies such as boilers, stokers, turbines and rotary converters to place it in a position to fulfill this demand.

For the past twelve years and until April 1, 1917, the Railway & Light Company was purchasing approximately 8000 hp. from the Niagara, Lockport & Ontario Power Company, whose transmission line extends from Niagara Falls to Syracuse and whose system has been further extended to the Salmon River development. Owing to the excessive demand for power in the Province of Ontario, the Niagara, Lockport & Ontario Power Company's supply from Niagara Falls has been somewhat reduced, and, while it has added materially to its steam plant at Lyons, owing to the cutting down of its power from the falls and the greatly increased demand for power on its system it was found that it would be impossible for it to continue to furnish to the Railway & Light Company the 8000 hp. previously supplied.

The company has, however, agreed with the lighting company to maintain its tie line connection with us from Mortimer, and it was due to the use of this connection and the company's courtesy that the interruption on Thursday was not of longer duration.

The lighting company had expected to have its new hydraulic development at the lower falls completed by July 1, but delays in receiving material and scarcity of labor have held this up and it probably will be well into October before this new development is put in operation. Two new boilers of 6000 kw. capacity ordered for the No. 3 steam power plant, which were promised us in sufficient time so that they should have been in operation on Aug. 1, have been delayed, and it probably will be the middle of September before these are installed.

It has been necessary to purchase materials over as broad a territory as from Michigan to Connecticut in order to get any satisfactory promise of delivery. It further has been necessary to keep two of our men on the road visiting the various manufacturing plants and insisting upon the pushing forward of the work and, after the material is placed on the cars, to have it followed up personally by one of our men to see that it is not delayed at the various freight terminals. Never have we been in so unsatisfactory a position as at the present time, because of the conditions which have been brought about by the tremendous industrial activities caused by the war.

With the arrangements we have been able to make for emergency use of power from the Niagara, Lockport & Ontario Power Company and the expected arrival of materials which will be installed with the greatest possible speed, we confidently expect to satisfy the demands for power of both the railway and our various manufacturing plants in Rochester. The demand, however, will be excessive until the new apparatus and the new hydraulic plant at the lower falls are put in operation.

Short interruptions may occur, but we wish to assure the public that everything possible which can be done by human means to avoid such annoying interruptions as occurred on Thursday will be done, and we expect to maintain our service equal to the former satisfactory standard. Should we, through unforeseen circumstances, however, be unable for short periods to supply power we shall expect to receive the same hearty co-operation as in the past.

The Kansas City Light & Power Company has secured the co-operation of large power users in the Kansas City district, whereby loads will be distributed through the night and energy conserved pending the installation of equipment adequate for handling the business. The consumers were called into conference with officials of the company and appointed a committee of their engineers to meet with the company engineers and analyze the situation. The engineers collected data on the available energy and on needs of the consumers and arranged a schedule of distributing the load. Large plants will put on night forces to relieve the day peak loads and still use their equipment for the employment of electrical energy.

R. L. Redpath, manager of the American Radiator Company at Kansas City, was chairman of the consumers' committee. The plants represented included the Kansas City Bolt & Nut Company, the Kansas City Structural Steel Company, milling companies and similar institutions.

Cause of the Shortage in Kansas City

The production of electrical energy in Kansas City has fallen short of needs from two causes—the large increase in the requirements of the Kansas City Railways Company and the inability of the Kansas City Light & Power Company to secure additional equipment for its plants ordered six, twelve and eighteen months ago. During the past few weeks there have been times when the electric cars have failed, and the supply of energy to general consumers has also failed because of the breaking down of equipment under excessive load.

The Kansas City Railways Company, with large capacity, has been under contract to give the Kansas City Light & Power Company its surplus energy. The Kansas City Light & Power Company has two plants with a maximum rating around 16,000 kw. The railway company has been delivering around 16,000 kw. to the light company. The increased business this summer has prevented the overhauling of equipment in both plants, and new equipment could not be secured. The result has been the absolute necessity of cleaning out boilers and making repairs, sometimes brought about by actual breakdowns. Therefore service has suffered.

The light company put into service on Aug. 8 a unit of 1500 kw. received recently and another 1500 unit the middle of the month. By Oct. 1, it is hoped, further increases in capacity can be attained, perhaps providing a total of about 26,000 kw., not counting reserve,

which will handle the business fairly well. The company will then have installed about 21,500 kw. of new equipment.

The company is spending about $1,500,000 on its Central Avenue plant and on its Baltimore Avenue heating plant, sources of electrical energy. This is admittedly temporary installation, pending the suitable time for beginning work on its permanent large power plant.

The Kansas City Light & Power Company recently paid $250,000 for 25 acres close to Kansas City on the Missouri River as a site for its permanent power plant. Building plans are ready, but no negotiations for equipment or construction will be begun until present unsettled conditions are improved.

ANNUAL TEACHERS' COURSE AT THE WESTINGHOUSE WORKS

Twenty-four Men from Different Engineering Schools in This Country, Canada and Japan at East Pittsburgh Plant

For several years past from fifteen to thirty engineering teachers have spent part of the summer vacation at the East Pittsburgh works of the Westinghouse Electric & Manufacturing Company in getting acquainted not only with the apparatus manufactured by this company, but also with its engineering designers, commercial engineers and works executives. This year there are twenty-four men from seventeen different states and from Canada and Japan, representing twenty-three different engineering schools.

Most of their time is spent on actual work, either on assembly or test floor or in the engineering offices, but part of the time is given up to a series of meetings, which include inspection and discussion of apparatus being manufactured, talks on engineering opportunities and requirements, discussions of teaching problems, excursions to other plants and social meetings.

This course gives engineering teachers an opportunity to become acquainted with the latest developments in electrical power apparatus, with shop methods in use in large manufacturing concerns, and to meet and exchange ideas on teaching subjects with other engineering teachers of experience. Since the Westinghouse company draws men from engineering schools, it is of advantage to it that students may know not only of the opportunities open but of methods of working efficiently in its organization.

As shown by the accompanying illustration, the following are in attendance at this summer's course:

Top row (left to right)—J. F. Wilson, Queens University; R. S. Ferguson, Throop Institute; W. A. Dart, Clarkson College; P. Cloke, Clarkson College of Technology; A. M. Holcomb, Case School; F. H. McClain, Ottawa University; H. H. Higbie, University of Michigan; H. C. Bartholomew, Iowa State College; A. S. Langsdorf, Washington University; M. M. Cory, Michigan Agricultural College; R. Beach, Norwich University; C. E. Magnusson, University of Washington, and T. C. MacKay, University of Washington.

Lower row (left to right)—C. W. Ricker, Massachusetts Institute of Technology; W. B. Kouwenhoven, Johns Hopkins University; D. P. Savant, University of Missouri; H. A. Weiss, Georgia School of Technology; H. A. Brown, University of Arkansas; G. Shimizu, Kyoto Imperial University; G. D. Robinson, Pennsylvania State College; H. Mori, Kyushu Imperial University; C. A. Biorkman, Kansas State Agricultural College; F. T. Dargan, Clemson College, and R. C. Disque, University of Wisconsin.

AMERICAN, CANADIAN AND JAPANESE ENGINEERING TEACHERS AT EAST PITTSBURGH

Higher Steam-Heat Rates Asked in Indiana

There will be a hearing before the Indiana Public Service Commission on Aug. 30 and 31 upon separate petitions filed by the Indianapolis Light & Heat Company, the Merchants' Heat & Light Company and many other companies for authority to increase heating rates because of the great increases in the price of fuel and other things essential to the heating business.

NEW POWER CONSTRUCTION OF THE ATLANTA COMPANY

War-Time Industrial Demands Force Georgia Railway & Power Company to Increase Generating Capacity—$2,500,000 Note Issue

The Georgia Railway & Power Company, Atlanta, has petitioned the Georgia Railroad Commission for authority to issue $2,500,000 in notes for new development projects. The securities are to be 6 per cent two-and-one-half-year collateral notes, dated Aug. 1, 1917, and redeemable in amount not less than $500,000 on Aug. 1, 1918, or thereafter.

It is proposed to install a sixth unit at the Tallulah Falls plant consisting of one 12,000-kw., 514-r.p.m., 6600-volt vertical generator, complete with waterwheel, penstocks and switches, and three 4000-kva., 6600/110,000-volt, single-phase, 60-cycle transformers. This will give an additional plant capacity of 30,000,000 kw.-hr. per year. A new storage basin is contemplated at Burton Lake, above the present Mathis Lake. This storage is equivalent to 40,000,000 kw.-hr. per year.

A further development is being considered on the Tugaloo River below the junction of the Tallulah and Chattooga Rivers, about 2 miles (3.2 km.) below the present Tallulah Falls power house. The dam will be of cyclopean-type masonry with 138-ft. (42-m.) head. The probable equipment will include four 12,000-kw., 6600-volt, three-phase, 60-cycle units and six 8000-kva., 6600/110,000-volt, single-phase, 60-cycle transformers of two banks, including switches and outdoor steel station. The output of this plant is expected to be 116,000,000 kw.-hr. per year.

War-time construction has been forced on the company by exceedingly heavy industrial power demands.

ELECTRICAL CONTRACTORS' MEETING IN GEORGIA

Resolution Pledges Loyalty to the Government and Support in Its Course—Norton Frierson Elected President

The convention of the Georgia Electrical Contractors' Association, held at Tybu Island, Georgia, was called to order at noon on Aug. 13, by the president, J. M. Clayton, Atlanta. E. H. Grim, sales manager of the General Electric Company, Atlanta, made an address on "Co-operation."

In the annual report of the president Mr. Clayton spoke at length on co-operation and the duty of the electrical contractors toward the government, especially at this time. He said further that the association was on the eve of an era of great usefulness, as is illustrated by its rapid growth.

The following resolution, presented by President Clayton, was adopted unanimously:

> Whereas our government is now actively engaged in warring for the preservation of democratic institutions and ideals and in that fight needs the active support, either moral or physical, of all who love their country, therefore be it
>
> Resolved by the Electrical Contractors' Association of Georgia that we at this time renew our pledges of loyalty to our country and the cause for which she is struggling, and that we offer our best efforts in support of our government.

The annual report of the treasurer showed that the association was in a healthy financial condition.

New by-laws were presented by a committee composed of T. H. McKinnly, Hunter Hogue and C. B. McGaukey, all of Atlanta, and adopted unanimously. Alfred L. Brill, Augusta, was elected to membership.

A banquet was held in the evening at the Tybu Hotel; and a number of talks were made.

The nominating committee, composed of H. J. Von Weller, C. F. Ludwig and F. J. Frie, presented the following nominations: President, Norton Frierson, Savannah; first vice-president, Joel H. Weir, Athens; second vice-president, Derando Levy, Columbus; treasurer, Gadsen Russell, Atlanta; secretary, Dan Carey, Atlanta. The nominees were elected unanimously, and the following directors were appointed: F. M. Byrne, F. J. Frie, J. H. McNeil, K. D. White, C. B. McGaukey, J. M. Clayton, H. E. Lowe, H. J. Von Weller, C. F. Ludwig, Sylvester Byck. The executive committee is composed of C. F. Ludwig, chairman; Joel H. Weir, J. M. Clayton, C. B. McGaukey, and Norton Frierson and Dan Carey, ex officio.

R. M. Walker, Atlanta, was elected national director and will represent the association at the convention of the National Association of Electrical Contractors to be held in New Orleans in October.

BUFFALO COMPANY BONDS OFFERED TO CUSTOMERS

Convertible Debentures Can Be Bought by Them on the Installment Plan if They Desire—Dividend Rate Is Raised

The Buffalo General Electric Company is offering an opportunity to customers to share in the profits and have a voice in the management. Letters have been sent to customers offering them the first opportunity to buy the new five-year 6 per cent convertible debenture bonds, dated Aug. 1, 1917. In order to interest as many customers as possible the company has issued bonds in denominations of $100, $500 and $1,000. Charles R. Huntley, the president of the company, in his letter to customers, says:

"After Aug. 1, 1919, you will have the privilege of exchanging your bonds for stock, obtaining one share of stock for every $100 in bonds. This stock under war conditions is selling at $103 per share, and under normal conditions has sold above $110 per share, and is now paying dividends at the rate of 7 per cent.

"An opportunity is also given to pay for bonds under an installment plan through the Buffalo Trust Company, the company's financial agent."

The Buffalo General Electric Company increased its dividend rate from 6 to 7 per cent with the last quarterly payment, which was 1¾ per cent instead of the usual 1½ per cent. In commenting upon the increased rate, Mr. Huntley said:

"The dividend increase within two years after the broad reduction in meter rates reflects exceptional credit on the management of the company and represents, not only a healthy growth in business, but also economies and efficiency in administration to offset the general increase in costs of all machinery and equipment."

NEW LAMP CONTRACTS FOR CENTRAL STATIONS

Committee of National Electric Light Association Issues Information Concerning Agreements Offered by the Manufacturers

The lamp committee of the National Electric Light Association, of which Frank W. Smith is chairman, has sent to member companies a circular regarding new forms of lamp contracts. It says in part:

In the report of your committee for the current year announcement was made of a new form of contract then in contemplation by the lamp manufacturers, and it was stated that the committee would bring directly to the attention of the member companies at a later date detailed information with reference to this subject.

Contracts which are now offered are in the form of alternative agency agreements known as Forms CB and CA, the former being used where the total annual lamp requirements of a central station amount to over $7,500 and the latter being used where the lamp requirements are under $7,500 for a year.

The contracts provide for delivery to the central station on consignment of incandescent lamps which may be disposed of under the following conditions:

1. Under the Form CB only the sale of lamps through dealers (CBA agents) who hold appointment through the central station company.

2. The sale of lamps directly to customers of the central station company at standard prices.

3. The supplying of lamps by central station companies to their customers through free renewal, without charge, through some service arrangement involving a charge, or the sale of lamps at a price that shall not be greater than an amount equal to the manufacturer's prevailing list price less all discounts.

It will be seen that under this new form of contract central station companies are appointed as agents for the manufacturers for the sale of large incandescent lamps (miniature excluded), *i.e.*, standard types and sizes of Mazda and Gem lamps, and that under this arrangement the lamp stock is consigned by the manufacturer and paid for as sold by the central station company.

All lamps so distributed are subject to the basic percentage varying in accordance with the net value of lamps sold during the agreement period. In addition to this compensation percentage there is a 5 per cent compensation for prompt monthly report of sales and cash payment therefor. This compensation may be taken on all monthly returns to the manufacturer, provided that sales reports are rendered and accounts settled in cash by the tenth of the following month.

Central stations eligible to Form CB appointments (central stations purchasing lamps to the amount of $7,500 a year) are privileged to appoint local dealers as their agents, and on the lamps sold by these agents an additional compensation of 5 per cent from the list is allowed. Form CA agents (central stations purchasing lamps in an amount less than $7,500 a year) are not privileged to appoint local distributers as their agents, and the additional 5 per cent compensation from list referred to above does not therefore apply.

Central stations adopting either the CB or CA agency appointment and who distribute lamps to customers without cost (free renewals), or who distribute lamps to their own consumers at some service charge or at cost (manufacturer's list price less all discounts), receive on lamps so distributed an additional 5 per cent from the list.

The manufacturers have issued descriptive pamphlets in the nature of instructions, one for Form CB agents (central stations purchasing annually more than $7,500) and the other for Form CA agents (central stations whose annual purchases are less than $7,500). These pamphlets describe the conditions and requirements of the new forms of agreement and are set forth in considerable detail.

Form CB member companies (central stations purchasing lamps to the amount of $7,500 a year) will have to decide whether it will be more profitable or satisfactory to sell lamps directly to customers at standard prices or to have them distributed to its customers through dealers, or they may do both.

Form CA member companies (central stations purchasing lamps in an amount less than $7,500 a year) are not privileged to appoint dealers as their agents and therefore are limited to their own efforts in the sale of lamps.

It will be apparent that only those central stations that sell lamps to consumers above net cost and below established prices and desire to continue the practice are eliminated from the list of those who can be served under the agency forms of agreement.

It is suggested that for full and complete information you consult the manufacturer serving you or your territory. The committee, of course, will be glad to be helpful in any way possible.

HEARINGS ON THE INDIANA RATE CASES

Applications of Individual Companies for Authority to Add a War Surcharge of 30 per Cent Under Consideration

A three-day hearing on the petitions of electric companies for permission to add a surcharge of 30 per cent in rates to customers was begun on Monday afternoon, Aug. 20, before the Indiana Public Service Commission.

After general matters relating to the consolidated hearing had been handled, the petition of the Browne-Mills Electric Company of North Manchester was taken up. The city of North Manchester was represented among the protestants. Other petitions to be considered during the day were from the Batesville Electric Light & Power Company, the Madison Light & Railway Company and the Oakland City Light & Power Company.

The hearing on Tuesday centered on the petitions of the Rockport Water Works Company, the Owensville Light Company and the Boonville Electric Light & Power Company.

The petitions of the Martinsville Gas & Electric Company, the Indiana Utilities Company and the Wabash Valley Electric Company were heard at the Wednesday meeting.

The original petition was in the name of the Indiana Electric Light Association, and nearly all of the electric companies in the State joined. The commission decided that the right of the association to petition on behalf of its various members was questionable, and ruled that each company seeking war relief should file a separate petition. In complying with the commission's ruling about one-half of the companies included in the original petition filed separate applications, and the others apparently dropped out, or have not yet decided what course to follow. Among the companies which failed to refile surcharge petitions was the Interstate Public Service Company, which furnishes electric service to many Indiana cities and towns. A hearing has been held on the petitions of the Indianapolis Light & Heat Company and the Merchants' Heat & Light Company, Indianapolis, as reported in last week's issue of the ELECTRICAL WORLD.

Several electric companies which were petitioning the commission for authority to add surcharges to service bills because of war price increases announced on Aug. 22 their withdrawal of the petitions following the promulgation of coal prices by President Wilson. The commission did not announce what action it would take on the petitions of companies already heard.

A. I. E. E. COMMITTEES ARE APPOINTED FOR NEW YEAR

Work of Patent Committee and Committee on Development of Water Power Now in Engineering Council

The first meeting of the board of directors of the American Institute of Electrical Engineers for the administrative year beginning on Aug. 1, 1917, was held at the headquarters, New York, on Aug. 14. There were present President E. W. Rice, Jr., Past-president John J. Carty, Vice-presidents B. A. Behrend, L. T. Robinson and A. S. McAllister, Managers F. B. Jewett, William A. Del Mar, John B. Taylor, C. E. Skinner, Charles Robbins, N. A. Carle, E. H. Martindale and Walter A. Hall, Treasurer George A. Hamilton and Secretary F. L. Hutchinson.

President Rice announced the appointment in part of the committees for the administrative year. The chairmen of the committees appointed are:

Finance, N. A. Carle, Newark, N. J.
Board of examiners, A. S. McAllister, New York.
Editing, W. I. Slichter, New York.
Meetings and papers, L. T. Robinson, Schenectady, N. Y.
Sections, Walter A. Hall, West Lynn, Mass.
Student branches, P. H. Daggett, Chapel Hill, N. C.
Code, Farley Osgood, Newark, N. J.
Standards, C. A. Adams, Cambridge, Mass.
Headquarters, N. A. Carle, Newark, N. J.
Code of principles of professional conduct, George F. Sever, New York.
Transmission and distribution, L. E. Imlay, Niagara Falls, N. Y.
Lighting and illumination, Edward P. Hyde, Cleveland.
Telegraphy and telephony, L. F. Morehouse, New York.
Electrochemistry and electrometallurgy, F. A. J. Fitzgerald, Niagara Falls, N. Y.
Power stations, Philip Torchio, New York.
Marine, H. A. Hornor, Philadelphia.
Industrial and domestic power, E. H. Martindale, Cleveland.
Electrical machinery, Alexander M. Gray, Ithaca, N. Y.
Instruments and measurements, S. G. Rhodes, New York.
Protective devices, D. W. Roper, Chicago.
Mines, H. H. Clark, Pittsburgh.

The patent committee and the committee on the development of water power were not reappointed, as it was felt that the functions of these two committees now come properly within the scope of the newly organized Engineering Council.

Guido Semenza was reappointed local honorary secretary for Italy for the two years ending July 31, 1919.

In accordance with the by-laws of the Edison medal committee, the board elected from its membership John J. Carty, B. A. Behrend and A. S. McAllister to serve on the committee for two years, and L. T. Robinson to serve for one year to fill the unexpired term of a retiring member of the board of directors.

Upon recommendation of the board of examiners seven students were ordered enrolled, eighty-eight applicants were elected to the grade of associate, six applicants were elected to the grade of member, nineteen applicants were transferred to the grade of member, and two applicants were transferred to the grade of fellow.

The program of Institute meetings for the coming year was discussed. It was voted to hold the October meeting in Philadelphia on Oct. 8, and the November meeting in New York on Nov. 9. Final decision regarding the rest of the program was deferred until the October meeting.

TECHNICAL STUDENTS ARE NOT EXEMPT FROM DRAFT

Secretary of War Baker, Upon Re-examination of the Statute, Finds that Exemptions Are Limited Specifically

Recently a letter was issued by P. P. Claxton, commissioner of the Bureau of Education of the Department of the Interior, stating that the War Department believed that students in technical schools and colleges who are within the age limits of the selective draft should be treated in the same manner as workers in industries which are devoted to the manufacture of war materials, and that under this ruling presidents of colleges and technical schools might properly urge the district exemption boards to exempt students in their institutions who give promise of special aptitude for the technical and scientific professions until these students have finished their courses. It was stated in the letter that institutional officers would be expected to exercise due caution and not claim exemption for students whose success in technical careers is open to doubt and that each case should be considered by the district exemption board on its own merits, students in technical schools not being exempt as a class.

Subsequently Mr. Claxton was informed by Secretary of War Baker that there is no legal basis for such exemption. Mr. Claxton has therefore given notice that his first letter should be disregarded.

Upon re-examination of the statute Secretary Baker found that the exemptions are limited to persons engaged in industry, including agriculture, and that there is not the slightest statutory warrant for exemptions based upon the importance of preserving continuity of instruction to young men in scientific or other schools and courses.

Mr. Baker expressed deep regret that this error on his part had arisen, and that misunderstanding had been caused to those who are engaged in conducting these valuable scientific educational institutions.

LIGHT SERVICE OFFERED TO CITY OF SPRINGFIELD, ILL.

After Municipal Authorities Turn Off Street Lamps at Midnight Local Company Proposes to Furnish Necessary Energy

The municipal light department of Springfield, Ill., has ordered that all street lights be extinguished at midnight, alleging that the financial condition of the city necessitated this action.

A. D. Mackie, vice-president and general manager Springfield Gas & Electric Company, stating that the service of the associated railway company had been jeopardized by the abandonment of service, therefore made the following proposal to the city authorities:

In order to eliminate as far as possible any danger arising from such condition of unlighted streets, this company offers to make the necessary connections between its power plant and the city's street lighting switchboard, and furnish the necessary electric energy to light all of the city's street lamps after midnight. For the electric energy so furnished this company will accept the rate now being charged the city by its own lighting department for such service.

Inasmuch as the commissioners announce that the city is without credit, this company will extend credit for the payment for such service until the city is in funds.

Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies.

Validity of Commission's Order in Rate Discrimination.—An order of the Corporation Commission requiring that natural gas be furnished to the board of education of the city of Guthrie for heating the public schools at a rate different and less than that charged to other consumers is not, by reason of the discrimination in favor of the public schools alone, invalid, the Supreme Court of Oklahoma held (166 P. 128). By law jurisdiction is conferred upon the Corporation Commission over all public utilities, with the power to fix and establish rates and prescribe rules, requirements and regulations affecting their services and operation and the management and conduct of their business, and under the powers thus conferred the commission is vested with authority to make all valid and lawful orders prescribing rates which the State, in the exercise of its sovereign capacity, has the power to prescribe or make.

Valid Contract for Service Enforceable.—In the case of Wackenhut vs. Empire Gas & Electric Company (166 N. Y. S. 29) the Supreme Court in Cayuga County, New York, held that a gas and electric company which entered into a contract with the mayor of a city to furnish service at certain rates in consideration of his dismissing a suit against the company, and which furnished service at those rates for a number of years, was thereafter estopped from denying the validity of the contract on the ground that it was ultra vires as to the city. In December, 1905, the Mayor of the city of Auburn filed a petition with the Commission of Gas and Electricity requesting it to fix the illuminating power, purity, pressure and price of gas in that city. Hearings were had before the commission, and all the evidence on the part of the petitioner had been furnished and an adjournment was taken to permit the Auburn Gas Company to furnish its evidence. During that adjournment representatives of the gas company and the city had various negotiations which culminated in a contract dated July 9, 1906. The defendant has since merged and taken over the properties, franchises, etc., of the Auburn Gas Company, and carried out the terms of the contract until on or about Aug. 1, 1910, since which time it has refused to furnish service in accordance with the contract which it had signed. The defendant declined to be bound by the terms of the agreement, claiming that the contract is illegal because made in perpetuity, also that it is ultra vires and void because neither the Mayor nor the city of Auburn had any authority to make it, and finally, because it was not a party to the contract, which was made by its predecessor. It was the conclusion of the court that the defendant is estopped from questioning the validity of the contract, which was made at its solicitation, which it has acted upon, and from which it has derived substantial benefits, and that it is valid and enforceable, at least during defendant's corporate existence, unless the terms of the contract, in so far as they attempt to fix the price at which gas should be furnished, should be superseded by rates fixed by the Public Service Commission, but until the determination of that question by said commission the contract is enforceable during the term of the defendant company's corporate existence.

Los Angeles Denied Right to Order Private Company to Discontinue Service.—In an action recently instituted by the Los Angeles Gas & Electric Corporation against the city of Los Angeles, Federal Judge Bledsoe has handed down a decision declaring that the city of Los Angeles exceeded its police powers in attempting to compel the private company to relocate parts of its system in order that the municipal street-lighting system might be properly constructed. The suit was filed when the City Council passed an ordinance providing that upon the proper notice to the private company poles and other property in the public streets of said city should be removed or relocated when necessary to provide for proper construction of the city's municipal street-lighting system. Upon seeking to enforce this ordinance and to compel the private corporation to relocate certain wires and cross-arms on one of the public streets of said city, the corporation sought by injunction to restrain the operation of the ordinance. A preliminary injunction was issued by the court and incidentally in due course the preliminary injunction was made final, the court declaring the ordinance null and void, upon the ground that it was not a proper exercise of the police power of said city and upon the further ground that there appeared to be no necessity for the regulation provided for in said ordinance. In commenting on the issue brought up for adjudication by the suit, Judge Bledsoe said: "I am in entire harmony with a plan of municipal improvement such as has been projected in the city of Los Angeles and as is here under consideration. I am, however, also firmly of the belief that until the city, by purchase, appeal to eminent domain, or otherwise, has lawfully and properly and justly eliminated competition it must meet its competitors as any other private agency would be compelled to meet them and must stand with them in the same relation to the law and let its success be measured by its ability satisfactorily to serve the public rather than by its power through the exertion of public functions to occupy a position of supremacy in the field which it deliberately has chosen to invade."

Commission Rulings

Important decisions of various state bodies involving or affecting electric light and power utilities.

Department Change in Pennsylvania Commission.—The Pennsylvania Public Service Commission has consolidated its bureaus of engineering and rates and tariffs into one division, to be known as the department of engineering, rates and tariffs, under the general direction of Herbert C. Hoover, chief engineer of the commission.

Duplication of Facilities Denied in Arizona.—The Arizona State Corporation Commission has refused to grant the application of Sanguinetti & Uwing of Yuma for authority to install a duplicate electric light and power system for Yuma. Service is being obtained from the Yuma Light, Gas & Water Company, which obtains its energy from a California hydroelectric transmission system. The commission says: "A duplication of facilities resulting in unnecessary investments is certain to react against the consumer in the end, for the consuming public must bear the burden of maintaining two institutions where one would suffice."

Savannah Rates Again Under Consideration.—The Georgia Railroad Commission is to give a hearing to a petition from the Savannah Electric Company for permission to make a new and lower rate for electric power in wholesale quantities. The average rate which the company proposes to put in force is 8½ mills per kilowatt-hour, a reduction of about 15 per cent for electric power in large quantities. The Savannah Lighting Company has filed a protest against the granting of this rate, desiring that the higher rate now charged be retained. It is said this company will fight the reduction. The reason the commission has to pass on the new and lower rate is because it is a departure from the percentage rates which the commission has laid down.

Hearings on Regulatory Legislation in New York.—The New York Public Service Commission, First District, will continue on Sept. 17 hearings begun last week under the novel plan for "drafting legislation in the open." It is the purpose of the commission to obtain a thorough hearing of amendments proposed to the statutes under which it works, both as to such amendments desired by it and as to such as are proposed by corporations and individuals. At the first hearing last week proposals were made that all water companies, either municipal or private, within the State should be placed under the jurisdiction of one or the other of the two commissions. A bill was also proposed by which reparation of overpayments by consumers of gas and electric energy would be possible.

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest.

Denver Bonds Legal for Savings Banks.—The Denver Gas & Electric Light Company first and refunding mortgage 5 per cent sinking fund bonds have been legalized for savings bank investment in Maine and New Hampshire. This is in accordance with recent acts of the Legislatures.

Electric Fan Serves as Pulmotor.—The other day a worker employed at an East St. Louis (Ill.) industrial plant was overcome by ammonia fumes. In the absence of a pulmotor an electric fan was used to force a current of air into his mouth and nostrils. The treatment was effective and the man was restored to consciousness.

Nebraska Power Company Offers Stock.—The Nebraska Power Company, Omaha, is offering a limited amount of 7 per cent preferred stock at par to employees and patrons. The stock may be bought by an initial payment of $10 and subsequent payments of $10 per month per share with 6 per cent interest on the partial payments. This company acquired recently the Omaha Electric Light & Power Company.

Rate Settlement in Idaho.—The controversy between the City Council of Sandpoint, Idaho, and the Northern Idaho & Montana Power Company over lighting rates, which has been under way since last May, has been terminated. The rate for arc lights has been reduced from $72 per year to $60, and residence lighting from 15 cents per kilowatt-hour to 12 cents for the remaining two years of the contract. The street-lighting rate will date from May 1, and the residence rate from Sept. 1.

Jovian Order Asks Names of Members Who Are Now in Service of Uncle Sam.—As reported previously in these columns, the Jovian Order has adopted the policy of suspending payment of dues for the period of enlistment of Jovians who enter military service. The order is encountering some difficulty in obtaining the names of such members. It therefore requests that Jovians who enlist inform the Jovian central office, Syndicate Trust Building, St. Louis, so that proper records may be made. It also requests that those who know of Jovians in the service advise the central office.

Undeveloped Water Power Resources in Inland Empire.—At a recent luncheon of the Spokane (Wash.) Chamber of Commerce Carl F. Uhden, chief engineer Washington Water Power Company, gave an illustrated lecture on the water-power resources of the Inland Empire. There are about 250,000 hp. now developed, according to Mr. Uhden, and at least 2,000,000 hp. undeveloped in the territory. The cost of furnishing the power is estimated at $25 per year per horsepower for manufacturing purposes. The views included the power plants of the company in Spokane with 15,000 hp. capacity, the Long Lake plant with 45,000 hp. capacity, and the Little Falls plant with 36,000 hp. capacity.

Jovian State Fair Exhibit.—The outstanding feature of the exhibit which will be managed by the Minneapolis Jovian League at the Minneapolis State Fair, Sept. 3 to 8, will be an immense relief map of the properties of the Northern States Power Company, showing transmission lines, cities, rivers, waterfalls, etc. Apparatus on the map which measures 32 ft. by 34 ft. (9.7 m. by 10.3 m.) will be entirely electrically operated. The general plan of the league's participation in the State Fair is that the league has rented an entire building and has resold exhibit space to electrical jobbers, dealers, contractors and the central station company. Norman O'Neil was appointed general manager of the Jovian exhibit.

Purchases of Stock by Baltimore Consumers.—On June 30, 1917, a total of 2332 consumers of the Consolidated Gas, Electric Light & Power Company of Baltimore were purchasing 15,177 shares of stock. The total subscription price is $1,721,034. Of the total, seventy-one consumers had completed payments for 345 shares. When consumers complete payments President Herbert A. Wagner sends them a letter saying, in part: "The price at the time you accepted the offer was $106.50. Since then the subscription price has been increased from time to time, and subsequent subscribers are acquiring shares at the higher prices, but as these mature later the benefit of enhanced market value points to results comparing favorably with those secured to the earlier subscribers. The company is in a much stronger position than at any time in its history because of higher earnings, notwithstanding the lower rates charged for gas and electricity. The following statement shows exactly how your stock was paid for: Subscription price (ten shares), $1.065; cash payments actually made by you, $983.05; balance, $81.95; allowance by company made up of: interest at 6 per cent allowed on your payments, including adjustment of dividend accrued on stock at date of final payment, $50.70, and your proportion of amount received from sale of stockholders' rights to subscribe for new securities issued by the company in November, 1916, $31.25, or a total for the two items of $81.95. You have thus already received a return of $8.19 per share on your investment on the basis of the original price, or $16.69 per share based on a market price of $115. At the time of your subscription the dividend rate was 7 per cent. This has recently been increased to 8 per cent. You will therefore from now on receive a dividend of $8 per share per year, paid at the rate of $2 every three months, and at the same time profit by the increasing market value of the stock."

Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month on the next-to-last text page.

Alabama Association Meets in October.—The Alabama Light and Traction Association will hold its next meeting in Birmingham, Ala., on Oct. 23.

Kansas Public Service Association.—This association will hold its annual meeting at Salina, Kan., Oct. 19 and 20. W. W. Austin, Cottonwood Falls, Kan., is secretary.

International Association of Municipal Electricians.—The annual convention of this association will be held on Sept. 11 to 14 inclusive at Niagara Falls, N. Y. Clarence R. George is secretary.

Contractors to Hold Annual Convention in New Orleans.—The annual convention of the National Electrical Contractors' Association will be held on Oct. 10 to 13 at New Orleans, La. H. C. Brown, Utica, N. Y., is secretary of this association.

Paducah Company Employees Organize Club.—The High Tension Club has been organized by employees of the Paducah Light & Power Company of Paducah, Ky., to promote co-operation and general efficiency. H. A. Barbero is president and Frank M. Swift secretary.

Georgia Electrical Contractors' Association.—Ways in which electrical contractors and engineers can render valuable service to the United States government in the present emergency was the subject for discussion at the recent meeting of the Georgia Electrical Contractors' Association in the Winecoff Hotel, Atlanta, Ga.

Oregon Association of Electrical Contractors and Dealers.—The next annual convention of the Oregon Association of Electrical Contractors and Dealers will be held in Eugene, Ore., Sept. 17 and 18. At the last convention, held in Portland, there were about 200 dealers and contractors present, and while the local dealers do not expect as many to be present at the convention to be held in Eugene, they look for an attendance of from 100 to 150 to discuss trade problems.

American Electrochemical Society.—The next meeting of the American Electrochemical Society will be held at Pittsburgh, Pa., Oct. 3 to 6. Prof. J. W. Richards, Lehigh University, Bethlehem, Pa., is secretary. One of the features of this meeting will be a session devoted to the application of electrochemistry and electric furnaces to the manufacture of war supplies and munitions. An address by Alex Dow, president of the Detroit Edison Company, on "Production of Steam from Coal," will be another of the features of this meeting.

Men of the Industry

Changes in Personnel and Position—Biographical Notes

W. B. McSpadden has been appointed new-business manager of the City Light & Water Company, Amarillo, Tex., succeeding C. B. Buck in that position.

B. J. Crahan, who for the last eight years has been superintendent of the Joplin (Mo.) Gas Company, has been promoted to the management of the Port Huron (Mich.) Gas & Electric Company.

Andrew W. Rogers has been elected president of the Beverly Gas & Electric Light Company of Beverly, Mass., succeeding the late Sidney W. Winslow, who was president of the company for twenty-seven years.

David H. Cronheim has been appointed general sales manager of the Alabama Power Company, Birmingham, Ala., to succeed Theodore Swann. Mr. Cronheim has been assistant sales manager under Mr. Swann.

Walter B. Purse, formerly superintendent of construction of the Savannah Electric Company, Savannah, Ga., is now manager of the Griffin Lighting Company of Griffin, Ga. Mr. Purse will also be directing head of the water, sewerage and drainage commission of Griffin.

Jameson L. Finney has become superintendent of the Rumford Falls (Me.) Light & Power Company branch at Dixfield and East Peru. Mr. Finney has been employed with the electric light company at Bethel and for several years was with the Oxford Electric Company.

Stacy C. Richmond of New York City has been elected president of the Niagara Falls Power Company, the Niagara Junction Railway Company and the Niagara Development Company to fill the post left by Edward A. Wickes, resigned. Mr. Richmond has been a member of the boards of the allied companies for many years.

R. E. Carlson, who was formerly a member of the firm of Hoppin & Company, engineers, Peoria, Ill., has severed his connection with that organization in order to inspect the material produced for the government by the Nash Motors Company, Kenosha, Wis. Mr. Carlson recently received a commission as captain in the ordnance department.

Howard Walker, who has had many years' experience in the operation and construction of public utilities, has become identified with the Interstate Electric Corporation. He is also president and general manager of the Palestine (Tex.) Ice Company, the Palestine Water Works Company and the Jacksonville (Tex.) Electric & Ice Company.

Theodore Swann, who has been sales manager of the Alabama Power Company for the past three years, has resigned to become president and general manager of the Southern Manganese Corporation. The Southern Manganese Corporation is now operating six electric furnaces in the production of ferromanganese. The works are in Anniston, Ala., and the general office is in Birmingham, Ala.

Orie H. Hutchings, associate general manager and engineer of the Dayton Power & Light Company, was recently elected president of the Ohio Electric Light Association. Mr. Hutchings has been identified with the electric lighting and power industry since 1892, at which time he entered the service of the Dayton Electric Light Company, a predecessor of the Dayton Power & Light Company. After successfully filling several positions of less responsibility, he was made superintendent in 1907. With the further development of the company, which included the acquisition of several operating companies in places surrounding Dayton, he was promoted to the position of general superintendent and engineer, this promotion occurring in 1912. In July, 1915, he was promoted to his present position. Mr. Hutchings has been active in the work of the Ohio Electric Light Association for a number of years and has served on several important committees during this time. He is also identified with the National Electric Light Association, the American Institute of Electrical Engineers, and is an active member of the Dayton Engineers' Club.

O. H. HUTCHINGS

J. F. Usener, formerly chief engineer of the Houston Electric Company, has been made chief engineer of the Galveston-Houston Interurban Company. He succeeds Charles Learmouth, who has been sent to El Paso to become chief engineer of the El Paso Electric Company. Mr. Usener has been with the Houston Electric Company ever since the system was electrified, and until recently was in charge of the power plant. He will now have charge of the plants at League City, La Marque, South Houston and Sampson Street.

C. H. Holway has been transferred to Schenectady as engineer and inspector in that territory for the Underwriters' Laboratories.

C. B. Buck has been appointed new-business manager of the Durham (N. C.) Traction Company. Mr. Buck was new-business manager at Amarillo, Tex.

Harry Hollis, who has been electrical engineer with the Reading Transit Company, has resigned to become associated with the Bethlehem Steel Company, Lebanon.

H. C. Mathey, formerly assistant engineer for the Underwriters' Laboratories, recently resigned his position to become laboratory superintendent for the Okonite Company.

R. B. Shepard, who heretofore has represented the Underwriters' Laboratories at Schenectady, has been appointed assistant electrical engineer at the New York office of the Laboratories.

E. P. Slack, formerly assistant electrical engineer at the New York office of the Underwriters' Laboratories, has been appointed assistant engineer in charge of factory inspections and label service at this office.

Francis L. O'Bryan, well known as a designer of electric semaphore signals and electrical engineer of the Boston & Worcester Street Railway, has joined the purchasing department of the Edison Electric Illuminating Company of Boston, Mass.

A. B. Cheadle, who has had charge of the legal department of W. S. Barstow & Company, operators of public utilities, has become associated with the General Engineering & Management Corporation and is in charge of the legal department. The General Engineering & Management Corporation acts as engineer and manager for the subsidiary operating companies of both the Interstate Electric Corporation and the Commonwealth Light & Power Company.

Robert W. Adams was elected president of the Providence (R. I.) Engineering Society at its recent annual meeting. Mr. Adams was graduated from the Worcester Polytechnic Institute in 1904 and received the degree of electrical engineer in 1908. He has been connected with the General Electric Company for the last nine years and is at present manager of the Providence office. He is an active member of the Rhode Island Council of Defense and other civic organizations.

Obituary

Dr. R. M. Parks, formerly professor of chemistry in Louisville (Ky.) schools and city gas and electrical inspector since the office was created four years ago, died recently from cancer at his home in Louisville. Successive operations, one involving amputation of the right leg, failed to give relief.

REVIEW OF TRADE AND MARKET CONDITIONS

News of the Trade for the Manufacturer, Wholesaler and Jobber of Electrical Equipment and Supplies—Notes on Industrial Activities and Business Methods

EVIL EFFECTS CAUSED BY PRICE PROTECTION ORDERS

Not Many Manufacturers Comply with Jobbers' Resolution Calling for Discontinuance of Former Practice

Dissatisfaction has been expressed quite frequently of late over the attitude of manufacturers in continuing to announce increases in prices long in advance. Distributers generally prefer now to have these announcements simultaneously with the advance. In fact, the Electrical Supply Jobbers' Association, at its May meeting at Hot Springs, adopted the following resolution:

"Resolved, That it is the sense of this association that the interests of all concerned would be better served if protection orders or contracts were not accepted by manufacturers, and, further, if information regarding price advance were not given before the advance becomes effective."

This resolution was not without effect, because a number of manufacturers at once took steps to adopt the suggestion. However, the practice is by no means universal. It is thought, perhaps, that the majority of manufacturers do not believe that the distributers really wish to do away with price protection orders, because before the war the jobbers were very eager to know about coming price advances before they took effect.

There seems little doubt, however, now that the jobbers fully realize the evil effect that such a condition makes. For instance, a good many months ago the trade was tipped off concerning a coming advance in flexible metallic armored conductor, and as a result loaded up. The natural effect followed. A buyer to-day can go into the market and get almost any quotation on this material. Most of the quotations, it will be found, are less than the material can be purchased for direct from the manufacturers in carload lots. Those distributers who laid in a normal or slightly more than normal stock find now that they must compete with this over-stock that was purchased at rock-bottom prices.

Besides, those who purchased this abnormal stock found, to their sorrow, that they had tied up quantities of money for some time. Their credit was impaired, therefore, to that extent.

A far greater misfortune, however, is the effect the situation is having on the market in general. It is difficult to convince these distributers that although they laid in stocks at very low prices they should charge current market prices—prices that would show a satisfactory profit over present-day manufacturers' quotations. On the other hand, if no advances had been announced ahead of time the distributers naturally would stick to current market quotations. When prices begin to tumble, of course, these unwise distributers will realize their mistake, but then it may be too late.

Not only has this situation been acute as regards armored conductor, but also concerning sockets, switches, plugs, receptacles and similar brass goods, and as to certain heating appliances, principally flatirons.

Just a few weeks ago, when dry batteries advanced, one prominent manufacturer held back any announcement until the advance actually took effect. Some competitors, however, followed the older method of tipping the trade off in advance. Naturally the effect desired by the one who held back was lost.

From the manufacturers' standpoint, of course, there can be almost no logical excuse. Factories are loaded up with work and are not even able on the whole to come near normal deliveries. Business is being turned away right along, because the goods cannot be turned out fast enough. Consequently, there is no need for business stimulation. In fact, if the jobbers were loaded up to too great an extent, such a policy might act as a boomerang, leaving the manufacturers high and dry when they had finished turning out the goods ordered under the bait of low price.

ELECTRICAL EXPORTS FOR MAY AMOUNT TO $4,588,711

Foreign Trade for First Five Months of Current Year Reached Total of $23,000,000, in Comparison with $14,000,000 for First Five Months of 1916

During the month of May last electrical merchandise was exported from the United States totaling $4,588,711 in value, or considerably over $1,000,000 more than was exported during May, 1916. This brings the total for the first five months of 1917 up to $22,968,062, in comparison with $14,216,086 for the first five months of 1916. Based on the figures of the first five months of the current year, the electrical exports for 1917 should be in the neighborhood of $55,000,000.

Although the total exports for May were roughly $600,000 under the record of March last, the falling off was principally in items of a miscellaneous nature. To a large degree this can be attributed to import regulations of foreign countries on a number of items not necessities. However, during the month of May last records were set in the export of fans and again in the export of metal-filament lamps. The export of fans during that month amounted to $67,000, which is but a slight increase over the previous record, while the export of lamps amounted to $345,000, which is roughly $130,000 more than the record established in April.

Figures for the eleven months ended May last show a total export of electrical goods of $46,321,910, in comparison with $27,103,876 for the eleven months ended May, 1916, and $17,724,676 for the eleven months ended May, 1915. Of course, to a very great degree much of this increase can be attributed to an increase in prices. However, there seems to be no doubt that the total volume of goods shipped abroad is now greater than ever before in the history of the industry. There is a great demand for American goods in those markets which were formerly supplied by the nations of Europe and which have had to curtail or go out of the export field. This is particularly true of those markets formerly supplied by Germany and Austria.

The figures in the accompanying table are the official figures supplied by the Bureau of Foreign and Domestic Commerce:

Articles	May		Eleven Months Ended May	
	1916	1917	1916	1917
Batteries	$157,397	$204,526	$1,409,960	$2,566,830
Dynamos or generators	133,534	235,768	1,322,996	2,276,929
Fans	33,528	66,604	331,898	403,192
Insulated wire and cables	292,068	627,984	2,867,088	6,558,542
Interior wiring supplies, etc., including fixtures	38,393	121,928	782,150	1,020,933
Arc lamps	2,539	1,643	18,537	14,691
Carbon-filament lamps	9,833	15,438	140,684	136,546
Metal-filament lamps	140,649	345,261	1,148,356	1,785,751
Meters and other measuring instruments	79,641	84,294	703,841	955,077
Motors	428,984	427,224	3,897,827	5,245,908
Telegraph instruments (including wireless apparatus)	16,187	101,940	139,972	519,474
Telephones	358,675	156,917	1,145,381	1,670,352
Transformers	173,988	151,766	937,346	1,103,279
All other	1,572,175	2,047,418	12,257,840	22,064,406
Total	$3,437,609	$4,588,711	$27,103,876	$46,321,910

INDUCING CUSTOMERS TO BUY FROM STOCK

Shipping Promises on Special Goods Are Only Approximate and Dependent Upon Several Factors Beyond Producers' Control

Manufacturers for some time have been trying to persuade customers not to order special equipment, but to buy standard equipment from stock whenever possible. Not only are deliveries on special goods very long, but they are uncertain, although a rigid delivery date may be among the stipulations.

One of the large producers of small motors has recently called the attention of its distributers and local houses to this condition in the following language, which well sums up the situation:

"The attention of purchasers of goods which are not in stock should be called to the fact that promises of shipment can, of necessity, not be more than approximate shipping dates.

"Promises of shipment on goods which are not in stock and which must be manufactured after receipt of order cannot be regarded as definite assurances of shipment on the date set. The ability of the company to make shipment of special goods as expected is dependent on many factors beyond its control.

"Under these conditions every effort should be made to induce the customer to accept and use goods which are in stock and can be shipped promptly."

COPPER SHORTAGE MAY DEVELOP

Already Deficiency in Production That Had to Be Made Up from Surplus

Commenting on the copper situation, *Copper Gossip*, published by the National Conduit & Cable Company, has the following observations to make regarding a threatened shortage of copper:

"At the present rate of consumption, it will never do to allow a permanent decrease in the production of copper. The current situation demonstrates how rapidly we are approaching danger from a shortage in supplies of the red metal. During the first half of this year the exports of copper from the United States amounted to 595,353,920 lb.; and estimating domestic consumption at the conservative rate of 110,000,000 lb. a month, the total absorption of copper for the half year is 1,255,353,920 lb. For this same period the aggregate refinery production was estimated at 1,055,000,000 lb., or 200,353,920 lb. less than the quantity required for purposes of domestic manufacture and foreign shipment.

"The deficiency had to be made up from surplus stocks. With the strike conditions at Western mines greatly reducing output it is plainly apparent that an actual shortage of copper may develop in the near future.

NEW YORK METAL MARKET PRICES

	Aug. 13	Aug. 20
	£ s d	£ s d
Copper:		
London, standard spot	125 0 0	120 0 0
Prime Lake	28.50 to 29.50*	..... to .....
Electrolytic	27.00 to 27.50*	..... to .....
Casting	26.00 to 26.50*	..... to .....
Wire base	33.00 to 33.50*	34.00 to 37.00
Lead, trust price	11.00	11.00
Nickel, ingot	50.00	.....
Sheet zinc, f.o.b. smelter	19.00	19.00
Spelter, spot	8.67½	8.40
Tin, Straits	62.50*	62.75
Aluminum, 98 to 99 per cent	46.00 to 48.00*	..... to .....

OLD METALS

Heavy copper and wire	25.00 to 26.00	25.00
Brass, heavy	15.50 to 16.25	16.00 to 16.50
Brass, light	13.50 to 14.00	12.50 to 13.00
Lead, heavy	9.00 to 9.25	8.50 to 9.00
Zinc, old scrap	6.25 to 6.50	6.25 to 6.75

*Nominal.

THE WEEK IN TRADE

BUSINESS continued firm and steady during the week, with virtually no changes in prices taking place. In some lines there was the customary lull that precedes the fall buying, but this was made up by additional activity in other directions.

There are several price advances contemplated, it is understood, but producers are anxiously awaiting some definite sign from Washington regarding the position that the government is to take in the matter of prices.

Government construction work at the present time holds the middle of the stage, but much of it, such as cantonments, will be completed shortly and will permit producers to turn out their goods through the regular channels. At present government orders have taken the entire capacity of many electrical factories.

The raw materials situation is actually becoming worse, and in the matter of metal conduit particularly is causing considerable anxiety to the trade.

NEW YORK

Seasonal conditions generally prevail in the local market outside of government demands. Business on the whole is well maintained in volume, although the character is changed considerably. Except for government work contractors are not busy. New building is very small, although there is some prospect of its picking up during the fall months. Local owners, bankers, architects, contractors and supply men will probably have a conference on the building situation in the near future.

Prices show little tendency to change. There is so much uncertainty regarding the government's position in connection with prices that producers are generally holding back until some more definite statement comes from Washington.

CONDUIT.—Owing to the underlying conditions in the raw-materials market iron conduit is harder than ever to obtain. Prices, however, remain about the same.

PORCELAIN.—Just as the porcelain situation began to clear up a bit the cantonment demand arose and again tied up the supply. Mills are rushed on standard material, but because the government demand is for immediate delivery it will not be long before the mills will be able to give more attention to the trade.

ARMORED CONDUCTOR.—Local stocks are gradually being cleaned up, a considerable quantity being used in government work in the near vicinity. Some distributers, however, still have some pretty long stocks.

WIRE.—The demand is very steady and prices show but little variation. One manufacturer is quoting on as low as 34-cent base, but most of them are running on 36-cent and 37-cent base. Outlook for fall business is very promising, and already orders are being received. July was the largest month on record for authorized capitalization of new enterprises, some $400,000,000 being authorized. While, of course, all of this will not go into new building, it is indicative of a rapid growth in new enterprises which must be housed either in new buildings or old where alterations will undoubtedly have to be made. In either event an excellent demand for wire is expected.

INCANDESCENT LAMPS.—Jobbers' stocks, which earlier in the summer were considerably above normal, have shortened until they are now more nearly normal. An excellent business in July reduced local stocks generally.

INSULATION.—The Electrose Manufacturing Company, Brooklyn, N. Y., has received from the United States government a year's contract for the supply of all high-tension insulators for radio installations for both the army and the navy. In effect this is a renewal of last year's contract.

HEATING APPLIANCES.—Business is seasonable, being rather quiet just at present. After Labor Day, however, the demand for holiday stocks generally sets in and a big business is expected. There are rumors of price advances.

CHICAGO

The very definite peace talk of the last week seems fully to have awakened the trade to a realization that there may be some truth in predictions from financial sources that the war will end near the close of 1917. A checking up of sales records in some sources reflects this awakening and shows the situation to be about as follows: A number of large central station syndicates have ordered local operating managers to stop buying. These operating managers are in good shape to obey that order to the letter, because they have on hand staple stocks which are on the average about 100 per cent in excess of their usual quota for this time of year. There is a logical reason for the existence of these stocks. Deliveries have been so poor that stocks larger than ordinary were absolutely necessary. As an instance it may be stated that a certain central station not far from Chicago formerly ordered meters so closely that a delay of one day in shipping would exhaust its stock. This same station now has meters enough ahead to last a month. Some stations have enough meters to last eight months. The natural result is a decrease in orders to manufacturers. The factories, of course, have in some instances eighteen months' business booked ahead, so the situation is not in any sense critical. Nevertheless, cognizance must be taken of the fact that central stations are buying less freely and probably will continue this policy for at least two months.

TRANSFORMERS AND METERS.—It is noticeable that the average size of transformers ordered is increasing with greater rapidity as the necessity for effecting economies grows. One manufacturer states that the average sized unit now purchased is about 12 kw. The same tendency is noticeable in meters, but the increasing demand for 25-amp. instead of 5-amp. watt-hour meters is attributable to range sales.

FUSES.—The volume of business is a little less than normal, but manufacturers are looking to shipbuilding activities to stimulate sales.

VAPOR-PROOF LIGHTING EQUIPMENT.—Industries such as flour mills, which heretofore used any kind of improvised lighting available, are beginning to buy vapor-proof lighting equipment, which is found to be more suited to their needs. The development and more general distribution of these goods, originally intended for munitions factories, into the wider sphere is seen as the natural result of the success and the popularity they earned in extra-hazardous places.

LABOR.—The electrical contractors of Chicago, who have been embroiled in the strike precipitated by union demands for increased wages, are in a very much more optimistic mood than they have been at any time during the trouble. Forty contractors, or 75 per cent of the electrical contracting industry in the city, are at work again, employing men who are members of the new union. This union, known as the American Brotherhood of Electrical Workers, Local No. 1, has been formed with the sanction of the employers since the strike began. The members of this union can, of course, work on jobs with union men of other trades.

BOSTON

A falling off in business compared with last week appears in the New England jobbing trade. High prices, long deliveries and midsummer slackness of general trade appear to be responsible. No price advances, however, were reported within the week. The question of deliveries on steel stampings and conduit is causing much concern. Labor is actively employed, but the building trade is extremely quiet, with poor prospects for this fall. Collections are reported as not so good. Government work is increasing in volume and scope, but on account of the method of parceling it out it is not eagerly sought. It is still any one's guess as to whether prices will go higher, though there is some prospect of lower prices in the coal trade resulting from government action, which will probably ease the industrial situation somewhat. The New England Telephone & Telegraph Company has inaugurated a policy of endeavoring to persuade prospective subscribers who desire telephone service to delay their immediate demands for new or extensive installations in favor of the government's requirements. It is hoped that by spreading new installation work over a longer period than usual all interests ultimately may be served. Urgent demand for service is handled as usual.

SECOND-HAND EQUIPMENT.—The volume of business shows a moderate reduction in various lines, although the demand for transformers is so keen that none appear to be on the second-hand market. Large generators for industrial plant service, especially in munitions fields, are finding a ready and extended sale. Second-hand steam engines are moving very slowly, but the market for second-hand steam turbines is very active. Prices have in general followed the increases in prices noted in first-hand machinery, but no recent change is noted.

APPLIANCES.—This has been a quieter week in appliance movement, and not much gain is expected until after Labor Day. Prices remain firm and stocks fairly large. An active campaign for holiday orders among central stations began this week.

ELECTRIC RANGES.—Government orders are being filled steadily, and a fair domestic demand is noted in central station exchange sales.

CONTRACTING WORK.—Contractors are busy on government and repair jobs; industrial needs are influential, while domestic requirements are very light. The labor situation is good at present, and the draft has not been serious in its effect to date.

CONDUIT.—Demand continues strong, with deliveries very uncertain and prices most unstable.

ELECTRICAL INSULATING MATERIALS.—A good volume of business is recorded, but there is a dearth of small orders compared with last year. Deliveries are rather long for this class of material. No recent price changes are noted except an advance of 20 to 45 per cent in porcelain earlier in the month, which is now being reflected in the retail trade. Steel stampings are very hard to obtain for auxiliary construction purposes.

ELECTRIC CONTROLLING APPARATUS.—Business is excellent in this field—better than last year. No price advances have been noted since Jan. 1, and no sign of further increases is apparent at this time. Deliveries are inside motor delivery limits.

LAMPS.—The volume of trade holds up well, on the whole. Deliveries on standard sizes are improving and local stocks are increasing. No price changes are anticipated at present.

ELECTRIC VEHICLES.—Industrial electric vehicles continue to grow in popularity in Boston, and additions to existing fleets on the street have been quietly made this summer. The battery exchange system in Boston is clearly a factor in the growth of this business.

FIXTURES.—Movement is fair, but outlook poor for fall trade.

ATLANTA

All sources report business as being excellent with bright prospects for a continued demand in all lines. The erection of many new shipbuilding plants in the Southeast has created a strong demand for marine appliances and standard electrical equipment to be used in the yards. The Tennessee Coal & Iron Company, Birmingham, Ala., has large extensions under way, and it is probable that some big orders for electrical equipment will be placed shortly.

Permission was granted this week to the Georgia Railway & Power Company by the Georgia Railroad Commission allowing this company to issue $2,500,000 gold collateral notes, which is 50 per cent of $5,000,000 necessary to complete the developments contemplated. The additional $2,500,000 will be financed from various sources. Specifications covering electrical equipment are out and it is expected that orders for complete materials and machinery will be placed about the middle of September.

Contract for electrical work at Camp McClelland, Anniston, Ala., including all street lighting, power and interior wiring, has been awarded to T. H. McKinney, Inc., contracting electrical engineer, Atlanta. The camp proper will cover an area of 12 square miles with additional artillery

proving ground. Thirty thousand National Guardsmen will be taken care of, including base hospital, infantry and remount station. Definite specifications covering electrical requirements will probably be available next week.

Collections for the Southeast are in excellent shape and average 10 to 15 per cent better than a year ago this time.

TRANSFORMERS.—The demand and deliveries on the large power sizes remain about the same. Deliveries on standard 2300-volt distributing sizes show a slight improvement.

FLASHLIGHTS.—This week's sales show a considerable increase over normal, and prospects look good for a steady increase in this line during the coming fall months.

METERS.—So far this month meter sales are following the normal trend, which has always indicated August as being on the rising curve prior to the peak registered during September. Deliveries on the residence types remain about the same. A strong demand continues for the polyphase types, and shipments coincide with those promised on standard alternating-current motors.

POLES.—Nearly all utility companies are experiencing considerable difficulty in securing poles for necessary extensions. A large manufacturer with a number of plants throughout the Southeast has increased its facilities and thereby improved deliveries to favorite customers, but the demand exceeds immediate supply and deliveries from all sources are slowing up generally.

DRY BATTERIES.—Jobbers report that rainy weather during the past two weeks had tended to slow up business along this line.

FANS.—There is practically no demand for fans now, as the past two weeks have been cool, and as the season has advanced so far not much activity is expected from now on. One manufacturer reports this year's sales to-date covering the Southeastern territory to be 25 to 30 per cent better than last year. Business last year, however, was slightly below normal.

MOTORS.—This line is tapering off slightly owing to the fact that long deliveries have a tendency to lessen the demand from industrial sources.

WIRING DEVICES.—There is a steady demand and stocks are in fairly good shape. The government requirements have been on a strictly standard basis and have had very little effect on local stocks. A rumor has been circulated in Atlanta that prices on standard devices are to be reduced shortly. Investigators, however, do not seem able to find any authentic source for such information.

CABLE.—There is an apparent lessening in the demand for the heavier sizes, as large industrial work has slowed up for the time.

LAMPS.—Exclusive of government requirements for the 25-watt and 40-watt sizes, considerable activity has been noted this week; stocks are in good shape.

MARINE SETS.—Manufacturers report a good business in this line from the coastal cities during the past week.

ST. LOUIS

Very little change in general conditions has occurred since last week. Hence the usual enumeration of items is omitted in this report. No changes in prices, deliveries or collections were disclosed to the ELECTRICAL WORLD.

While it is true that the aggregate volume of sales is holding up well (the manager of the local office of one of the large companies says that this month now promises to be the best month the office ever had, even better than July), there seems to be a feeling that sales in supply lines may be decreasing. If such a decrease does occur, it may be due partly to the seasonal falling off which always occurs toward the fall of each year. The utility companies make their heavy purchases for summer construction in the spring and early summer, and obviously the purchases for winter construction are light. It may also in a measure be due to the facts, as previously explained in these columns, that utilities are curtailing purchases because of the high prices and that building operations, except those for industrial plants, are below normal.

One sales manager explained to the ELECTRICAL WORLD that while the jobbers' stocks line is not up to normal, considering the United States as a whole, it is in excellent condition, better probably than in most centers. One reason for this situation is that while the freight embargo was in force the manufacturers could not ship in certain directions. Shipments could, however, be readily made to Middle West points, and St. Louis then received her full share of stocks which had there been no embargo probably would have gone to other cities. It has been asserted that the Atlantic Coast cities were in particular affected by this stoppage of shipments and that they have not as yet recovered from it.

Complaint has been made that the payments for equipment furnished to cantonments are not as prompt as they might be. Some of these bills have been outstanding longer than a reasonable time, it has been stated. It could not be ascertained whether the government or the contractors are holding back in this connection.

SEATTLE

Orders from shipbuilding plants continue to dominate all lines of electrical activity. Hotels, offices and building along all lines are practically at a standstill. Small orders from shipbuilding plants for electrical equipment, such as wire, lamps, small motors and the like, swelled the volume of business during the past week. Recent orders were placed by the Chicago, Milwaukee & St. Paul Railway for pole-line equipment and poles to be used in the electrification of the main line from Othello over the Cascade Mountains to Tacoma, via Seattle. The bulk of the electrical material for this work, however, comes from the East. With 148 lumber mills reporting, the following official figures are given out for the past week: Normal production of lumber, 91,400,000 ft.: actual production, 44,512,096 ft. The decrease in lumber production is attributed directly to strikes in logging camps and lumber mills which remain unsettled.

Business along electrical lines, as compared with last week's report, is no better and no worse. Strikes are severely affecting sales of motors, transformers, wire, cable, lamps and the like to industries. Shipyard demand shows very slight increase. Stocks are low and buying light, just enough to supply demands. High prices of material are retarding the usual heavy fall buying. Credits and collections are good.

MOTORS.—Sales are dropping off as compared with two months back. Deliveries are slow, prices are increasing slowly, and stocks are low. Comparative heavy sales are expected as soon as the lumber strikes are settled and maximum price is reached.

FANS.—Sales are falling off with coming of fall. During the summer sales on sixes and fours were very satisfactory. Sales were pushed.

HOUSEHOLD DEVICES.—Electric sewing machines sales were pushed recently, and the result was very satisfactory; deliveries and supply meet demand. Washing-machine sales are picking up slightly, owing to the activities of dealers and central stations. Demand is being filled with but little difficulty. Heating-appliance sales are fairly satisfactory; deliveries are good and prices about the same. Electric ranges are moving satisfactorily, with prices about the same and deliveries fair.

WIRING DEVICES.—Demand is far below normal, owing to lack of building. Prices about the same.

POLE-LINE MATERIAL.—Most of the sales are for maintenance work only, and these are light. No new construction is anticipated until the present high prices subside and conditions are more settled. No particular change is seen in prices now. It is hard to obtain stock. These conditions also apply to wire and cable.

CONDUIT.—There has been a slight increase in demand. Stocks are low and deliveries very unsatisfactory. No increase is noticed in price.

LAMPS.—There is the usual seasonal demand. Sales are expected to increase materially in about a month. Large quantities are hard to obtain, although the various types are coming through fairly well.

Current Prices of Electrical Supplies

NEW YORK AND CHICAGO QUOTATIONS

The prices quoted are those prevailing in standard package or specified lots on apparatus and appliances in Eastern and Middle West markets at the beginning of business on Monday of this week. They are in all cases the net prices or prices subject to discounts from standard lists to contractors, central stations, dealers and others engaged in the resale of such goods.

Prices in Southern and other nearby markets will rule about the same as those in the Middle West, although slight modifications to cover increased freight and local demands should be expected. In the Far West and on the Pacific Coast the prevailing prices are naturally higher, covering as they must increased freight and the necessity of larger stocks with increased interest and warehouse charges on account of the distances from sources of supply, infrequent turnover of stock and uncertainty as to delivery of goods in transit. Moreover, the Far West presents a wide variation in demand due to a small population spread over a wide area in agricultural and mining communities, as contrasted with the denser population of the East and Middle West, their nearness to the source of supply, the more frequent turnover in stocks and the constant demands which arise in industrial centers.

The variation in prices may be due to the difference in grade of products made by different manufacturers, to local conditions or to both.

ARMORED CONDUCTORS, FLEXIBLE STEEL

Single-Conductor

B. & S. Size	List, per 1000 Ft.
No. 14 solid	$61.00
No. 12 solid	71.00
No. 10 solid	90.00
No. 8 solid	106.00
No. 6 solid	145.00
No. 10 stranded	95.00
No. 8 stranded	115.00
No. 6 stranded	160.00
No. 4 stranded	205.00
No. 2 stranded	266.00
No. 1 stranded	315.00

Twin-Conductor

No. 14 solid	104.00
No. 12 solid	135.00
No. 10 solid	185.00
No. 8 stranded	235.00
No. 6 stranded	370.00
No. 4 stranded	575.00

NET PRICE PER 1000 FT.—NEW YORK

Single-Conductor

No. 14 solid:	
Less than coil	$54.90 to $61.00
Coil to 1000 ft	48.80 to 59.17
No. 12 solid:	
Less than coil	63.90 to 71.00
Coil to 1000 ft	56.80 to 68.87

Twin-Conductor

No. 14 solid:	
Less than coil	$78.00 to $104.00
Coil to 1000 ft	75.00 to 80.00
No. 12 solid:	
Less than coil	121.50 to 135.00
Coil to 1000 ft	108.00 to 130.95

DISCOUNT—CHICAGO

Single-Conductor

Less than coil	+10%
Coil to 1000 ft	10%

Twin-Conductor

Less than coil	+10%
Coil to 1000 ft	10%

ATTACHMENT PLUGS

List ranges from $0.22 to $0.30 each. Standard packages from 100 to 250.

DISCOUNT—NEW YORK

Less than 1/5 std. pkg	—10% to 12%
1/5 to std. pkg	10% to 20%
Std. pkg.	34% to 44%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg	12% to +20%
1/5 to std. pkg	20% to Net
Std. pkg.	30% to 44%

BATTERIES, DRY

NEW YORK

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40	$0.40
12 to 50	.35	.35
50 to barrel	.31	.32
Barrel lots	.28	.29

BATTERIES, DRY—Continued

CHICAGO

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40	$0.40
12 to 30	.35	.35
50 to barrel	.31 to .31¾	.32 to .32¾
Barrel lots	.28 to .28¾	.29 to .29¾

CONDUIT, METALLIC FLEXIBLE

Size, In.	Ft. per Coil	List, per 100 Ft.
5/16	250	$5.00
⅜	250	7.50
½	100	10.00
¾	50	13.00
1	50	21.00
1¼	50	26.00
1½	25–50	35.00
2	25–50	45.00
2½	25–50	52.00

NET PER 1000 FT.—NEW YORK

	Less than Coil	Coil to 1000 Ft.
⅜-in. single strip	$67.50 to $75.00	$60.00 to $69.75
⅜-in. double strip	71.75 to 75.00	63.75 to 72.00
½-in. single strip	90.00 to 100.00	80.00 to 93.00
½-in. double strip	95.00 to 100.00	85.00 to 96.00

NET PER 1000 FT.—CHICAGO

	Less than Coil	Coil to 100 Ft.
⅜-in. single strip	$75.00	$63.75
⅜-in. double strip	78.75	71.25
½-in. single strip	100.00	$65.00 to 85.00
½-in. double strip	105.00	85.00 to 95.00

CONDUIT, NON-METALLIC FLEXIBLE

Size, In.	List per Foot	Size, In.	List per Foot
7/32	$0.05½	1	$0.25
¼	.06	1¼	.33
⅜	.09	1½	.40
½	.12	1¾	.47
⅝	.15	2	.55
¾	.18	2¼	.65

NET PER 1000 FT.—NEW YORK

	Less Than $15 List	$15 to $60 List	$60 to $150 List
7/32-in.—	$55.00	$24.50-$25.50	$21.50-$24.75
¼-in.—	$40.00-$60.00	$27.00-$30.00	$23.50-$27.00

NET PER 1000 FT.—CHICAGO

	Less Than $15 List	$15 to $60 List	$60 to $150 List
7/32-in.—	$36.67-$55.00	$25.50-$27.50	$23.10-$24.75
¼-in.—	$40.00-$60.00	$30.00	25.20- 27.00

CONDUIT, COUPLINGS AND ELBOWS, RIGID IRON

Card No. 38

Size, In.	Conduit, List per Foot
¼	$0.08½
⅜	.08½
½	.08½
¾	.11½
1	.17
1¼	.23
1½	.27½
2	.37
2½	.58½
3	.76½

	Couplings, List	Elbows, List
¼	$0.05	$0.19
⅜	.06	.19
½	.07	.19
¾	.10	.25
1	.13	.37
1¼	.17	.45
1½	.21	.60
2	.28	1.10
2½	.40	1.80
3	.60	4.80

DISCOUNT—NEW YORK

	¼ in. to ½ in.	¾ in. to 3 in.
Less than 2500 lb.	6% to 8%	8% to 10%
2500 to 5000 lb.	9% to 11%	11% to 13%

(For galvanized deduct six points from above discounts.)

DISCOUNT—CHICAGO

	¼ in. to ½ in.	¾ in. to 3 in.
Less than 2500 lb.	3.8% to 8%	5.8% to 10%
2500-5000 lb.	6.8% to 11%	8.8% to 13%

(For galvanized deduct six points from above discounts.)

FLATIRONS

NEW YORK

Net	$3.50

CHICAGO

List price	$6.00 to $6.00
Discount	25% to 30%

FUSES, INCLOSED

	Std. Pkg.	List
250-Volt		
3-amp. to 30-amp.	100	$0.25
35-amp. to 60-amp.	100	.35
65-amp. to 100-amp.	50	.90
110-amp. to 200-amp.	25	2.00
225-amp. to 400-amp.	25	3.60
450-amp. to 600-amp.	10	5.50
600-Volt		
3-amp. to 30-amp.	100	$0.40
35-amp. to 60-amp.	100	.60
65-amp. to 100-amp.	50	1.50
110-amp. to 200-amp.	25	2.50
225-amp. to 400-amp.	25	5.50
450-amp. to 600-amp.	10	8.00

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	28%
1/5 to std. pkg.	38%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	28%
1/5 to std. pkg.	38%

FUSE PLUGS

3-Amp. to 30-Amp.

NEW YORK

	Per 100 Net
Less than 1/5 std. pkg.	$5.75 to $6.30
1/5 to std. pkg.	4.50 to 5.25

Standard package, 500. List, each, $0.07.

CHICAGO

	Per 100 Net
Less than 1/5 std. pkg.	$6.25
1/5 to std. pkg.	5.25

Standard package, 500. List, each, $0.07.

LAMPS, MAZDA

105 to 125 Volts

Regular, clear:	Std. Pkg.	List, Each
10 to 40-watt—B	100	$0.27
60-watt—B	100	.36
100-watt—B	24	.65
75-watt—C	50	.65
100-watt—C	24	1.00
200-watt—C	24	2.00
300-watt—C	24	3.00
Round bulbs, 3½ in., frosted:		
15-watt—G 25	50	.50
25-watt—G 25	50	.50
40-watt—G 25	50	.50
Round bulbs, 3¾ in., frosted:		
60-watt—G 30	24	.72
Round bulbs, 4½ in., frosted:		
100-watt—G 35	24	1.05

DISCOUNT—NEW YORK

Less than std. pkg.	Net
Std. pkg.	10%

DISCOUNT—CHICAGO

Less than std. pkg.	Net
Std. pkg.	10%

LAMP CORD

Cotton-Covered, Type C, No. 18

NEW YORK

	Per 1000 Ft. Net
Less than coil (250 ft.)	$30.00 to $34.88
Coil to 1000 ft.	21.00 to 26.52

CHICAGO

	Per 1000 Ft. Net
Less than coil (250 ft.)	$37.20 to $37.84
Coil to 1000 ft.	27.90 to 28.38

LAMP GUARDS, WIRE

Standard packages from 50 to 150.

NEW YORK

Net per 100	$18.00 to $29.00

CHICAGO

Net per 100	$14.17 to $38.35

OUTLET BOXES

Nos.	List, per 100
101—A, A1½, 4 S.C., 6200, 320	$30.00
102—B.A., 6200 S.E., 300, A.X. 1½, 4 S.	30.00
103—C.A., 9, 4R, B 1½	25.00
106—F.A., 7, C.S. 1½, 3 R.	20.00

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $10.00 list	List to 33%	List to 27%
$10.00 to $50.00 list	List to 42%	37%

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $10.00 list	40%	35%
$10.00 to $50.00 list	50%	45%

PIPE FITTINGS

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	10%
1/5 to std. pkg.	20%
Std. pkg.	30%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	10%
1/5 to std. pkg.	20%
Std. pkg.	30%

PORCELAIN CLEATS—UNGLAZED

2 and 3 Wire

NEW YORK

	Per 1000 Net
Less than 1/5 std. pkg.	$14.00 to $20.00
1/5 to std. pkg.	13.00 to 15.00

Standard package, 2200. List per 1000, $20.

CHICAGO

	Per 1000 Net
Less than 1/5 std. pkg.	$15.80 to $20.54
1/5 to std. pkg.	13.00 to 19.24

Standard package, 2200. List per 1000, $20.

PORCELAIN KNOBS

NEW YORK

5½ N.C.—Solid Nail-it—N.C.

Per 1000 Net	Std. Pkg. 3500	Std. Pkg. 4000
Less than 1/5 std. pkg.	$10.50 to $24.30	$28.00
1/5 to std. pkg.	9.75 to 12.15	21.50

CHICAGO

5½ N.C.—Solid Nail-it—N.C.

Per 1000 Net	Std. Pkg. 3500	Std. Pkg. 4000
Less than 1/5 std. pkg.	$11.85 to $18.00	$20.75 to $30.75
1/5 std. pkg.	9.00 to 11.40	16.30 to 24.20

SOCKETS AND RECEPTACLES

	Std. Pk.	List
⅛-in. cap key and push sockets	500	$0.33
⅛-in. cap keyless socket	500	.30
⅛-in. cap pull socket	250	.60

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	Net
1/5 to std. pkg.	15% to 20%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	Net
1/5 to std. pkg.	15%

SWITCHES, KNIFE

250-Volt, Front Connections, No. Fuse

High Grade:	List
30-amp. S. P. S. T.	$0.80
60-amp. S. P. S. T.	1.20
100-amp. S. P. S. T.	2.25
200-amp. S. P. S. T.	3.48
300-amp. S. P. S. T.	5.34
30-amp. D. P. S. T.	1.20
60-amp. D. P. S. T.	1.78
100-amp. D. P. S. T.	3.38
200-amp. D. P. S. T.	5.20
300-amp. D. P. S. T.	8.00
30-amp. 3 P. S. T.	1.80
60-amp. 3 P. S. T.	2.68
100-amp. 3 P. S. T.	5.08
200-amp. 3 P. S. T.	7.80
300-amp. 3 P. S. T.	12.00
Low Grade:	
30-amp. S. P. S. T.	0.42
60-amp. S. P. S. T.	0.74
100-amp. S. P. S. T.	1.50
200-amp. S. P. S. T.	2.70
30-amp. D. P. S. T.	0.68
60-amp. D. P. S. T.	1.22
100-amp. D. P. S. T.	2.50
200-amp. D. P. S. T.	4.50
30-amp. 3 P. S. T.	1.02
60-amp. 3 P. S. T.	1.84
100-amp. 3 P. S. T.	3.76
200-amp. 3 P. S. T.	6.76

DISCOUNT—NEW YORK

High Grade:	
Less than $10 list	List to —5%
$10 to $25 list	11% to 16%
$25 to $50 list	14% to 24%
Low Grade:	
Less than $10.00 list	5% to —5%
$10.00 to $25.00 list	11% to 16%
$25.00 to $50.00 list	14% to 24%

DISCOUNT—CHICAGO

Less than $10 list	5% to +5%
$10 to $25 list	11% to 16%
$25 to $50 list	14% to 24%

SWITCHES, SNAP AND FLUSH

5-Amp. and 10-Amp., 125-Volt Snap Switches

	Std. Pkg.	List
5-amp. single-pole	250	$0.28
5-amp. single-pole, ind.	250	.32
10-amp. single-pole	100	.48
10-amp. single-pole, ind.	100	.54
5-amp., three-point	100	.54
10-amp., three-point	50	.76
10-amp., 250-volt, D. P.	100	.66

SWITCHES, SNAP AND FLUSH—Cont'd

10-Amp. 250-Volt Push-Button Switches

	Std. Pkg.	List
10-amp. single-pole	100	$0.45
10-amp. three-way	.50	.70
10-amp. double-pole	.50	.70

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	Net
1/5 to std. pkg.	15%
Std. pkg.	28%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	Net to +20%
1/5 to std. pkg.	15% to Net
Std. pkg.	30%

SWITCH BOXES, SECTIONAL CONDUIT

Union and Similar	List, Each
No. 155	$0.34
No. 160	.60

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $2.00 list	List to 23%	18%
$2.00 to $10.00 list	20% to 23%	18%
$10.00 to $50.00 list	23% to 30%	18%

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $2.00 list	25% to 50%	15% to 40%
$2.00 to $10.00 list	25% to 50%	20% to 40%
$10.00 to $50.00 list	25% to 64%	20% to 52%

TOASTERS, UPRIGHT

NEW YORK

Net price	$3.10 to $3.50

CHICAGO

List price	$4.50 to $5.00
Discount	25% to 30%

WIRE, ANNUNCIATOR

NET PRICE—NEW YORK

No. 18, less than full spools	$0.52
No. 18, full spools	0.48

CHICAGO

	Per Lb. Net
No. 18, less than full spools	$0.565 to $0.6885
No. 18, full spools	0.35 to 0.56

WIRE-RUBBER-COVERED, N. C.

Solid-Conductor, Single-Braid

NEW YORK

	Price per 1000 Ft. Net—		
No.	Less than 500 Ft.	500 to 1000 Ft.	1000 to 5000 Ft.
14	$15.00-18.00	$12.00-14.50	$11.50-12.50
12	21.06-28.35	18.96-24.30	18.01-20.25
10	29.60-39.83	26.64-34.14	25.31-28.45
8	42.40-56.49	38.16-48.42	36.25-40.35
6	72.19-89.39	64.98-76.62	61.73-63.85

CHICAGO

	Price per 1000 Ft. Net—		
No.	Less than 500 Ft.	500 to 1000 Ft.	1000 to 5000 Ft.
14	$18.00	$16.00	$14.00
12	25.99-29.89	21.96-25.62	20.13-22.50
10	36.49-41.50	30.84-35.58	28.27-31.57
8	48.84-60.13	43.80-51.50	40.15-44.86
6	70.24-82.20	63.85-75.35	56.54-60.50

WIRE, WEATHERPROOF

Solid-Conductor, Triple-Braid, Size 4/0 to 8 Inc.

NEW YORK

	Per 100 Lb. Net
Less than 25 lb.	$40.25 to $45.00
25 to 50 lb.	39.25 to 42.00
50 to 100 lb.	38.00 to 38.25

CHICAGO

	Per 100 Lb. Net
Less than 25 lb.	$42.35 to $45.50
25 to 50 lb.	41.35 to 44.50
50 to 100 lb.	40.35 to 43.50

NEW APPARATUS AND APPLIANCES

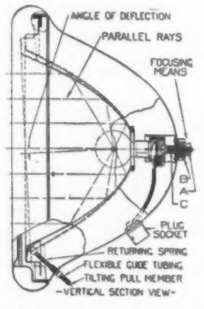
A Record of Latest Developments and Improvements in Manufacturers' Products Used in the Electrical Field

Solderless Cable Connectors

Solderless connectors which have been designed for use with concentric-laid cable are made by the United Cable Connector & Manufacturing Company, 1543 North Fawn Street, Philadelphia, Pa. These connectors consist of two tapered and hinged jaws held together by a compression nut which when screwed on tight will cause the connector to grip the main cable firmly and also be securely fastened to the branch cable. It is pointed out that this connector has been designed to carry a greater load than the cables themselves and will not bend out of shape or become loose in service. It is also claimed that the use of the connector prevents waste of copper due to ordinary splicing, and that the cost of the connector is less than the actual cost of a soldered splice.

Auto Headlight with Tilting Mechanism

The Benjamin Electric Manufacturing Company of Chicago has developed a tilting reflector with means for controlling from the steering wheel. Through the use of this reflector the light zone is limited to the roadway, and there is no necessity for diminishing the intensity of illumination. The principle of the equipment is not to diffuse or dim, but to control the projected light by changing the position of the reflector from the steering wheel. The reflector is pivoted on a horizontal axis passing through the lamp center, carefully balanced and held in normal position by a returning spring. At all times the angle of the beam (also the



AUTO HEADLIGHT THAT IS CONTROLLED FROM STEERING WHEEL

reflector) is under the instant control of the driver. The highest point of the beam when the reflector is set at a full-tilted angle is but 36 in. (91.4 cm.) from the ground. This can be made less if desired.

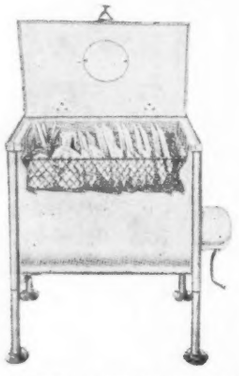
The reflector is made slightly oval, or elliptical; the vertical section through the axis is a true parabola.

No glare, it is claimed, is possible above the horizontal when the reflector is at full-tilt position, except momentarily on uneven roads. Even under those conditions the intense beam will be below the line of vision for the driver of an approaching car.

The diverging beam lights the roadway on the curving drives found in parks, etc.

White-Enameled Dish-Washing Machine

The Kitchen Service Company, 412 Orleans Street, Chicago, announces a new model of its "Minit" dish-washing machine. Underneath the basket as shown is a square shaft, and to this shaft are attached propellers or scoops. This shaft is connected directly to the electric motor by means of a spur gear. As the shaft is revolved at approximately 600 r.p.m., the propellers throw the water with great force upward and



ELECTRIC MOTOR ATTACHED BY MEANS OF SPUR GEAR

around the dishes in the basket. Every surface is cleansed both inside and outside—in that way removing all food particles, grease and every trace of dirt, it is claimed.

Breakage is practically impossible, for the reason that the hot water comes in contact with all surfaces inside and outside at the same time; therefore expansion is fairly equalized.

The legs or supports of the washer are of standard 1-in. (2.54-cm.) wrought-iron pipe, securely welded to the angle-iron framework. The body is formed from No. 24 gage sheet steel with all joints and corners welded. The propellers are riveted to the shaft and all parts are rust-proofed before being assembled. The motor is protected by a metal housing.

Three-Pint Percolator Pot

Percolator pots of solid copper, heavily nickel-plated and polished, are made by the General Electric Company of Schenectady, N. Y. Both the pot and spout are made of formed metal so that there are no seams to open and cause leaks. The inside surface is coated with tin. The ebonized wooden handle with comfortable grip always

SOLID COPPER PERCOLATOR POT

remains cool. The coffee container and the pump are of aluminum and are combined in one part. These, together with the cover and the aluminum distributer which spreads the dripping water over the coffee, are removable.

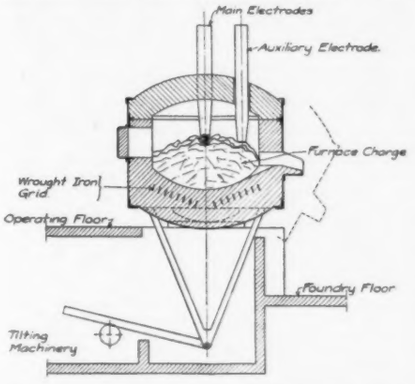
The pump fits over a short tube which forms a steam chamber in the center of a casting in the button of the pot. The heating unit is clamped to a flat disk forming the lower section of the casting. The heat is thus conducted directly to the short tube inside the pot where it is concentrated against the steam chamber. The capacity of this pot is 3 pints (1.6 l.).

Adjustable Cable-Reel Jack

The A. L. Swett Iron Works, Medina, N. Y., have developed a cable-reel jack that is constructed to carry a heavy load and at the same time is light enough to be easily portable. This jack is made in two sizes. The small size has a screw 14 in. (35.6 cm.) long with the height of stand to bearing point in yoke 20.5 in. (51.1 cm.). When the screw is up to the limit in this design the height to the bearing point in the yoke is 31 in. (78.7 cm.). The large cable-reel jack has a length of screw 16 in. (40.6 cm.), with a height of stand 26 in. (66 cm.), so that when the screw is up to the limit the height to bearing point in the yoke is 42 in. (106.6 cm.). It is said that this jack will swing a 7000-lb. (3175-kg.) reel.

Electric Furnaces for Single, Two or Three Phase Operation

The Booth-Hall Company, 505 West Washington Boulevard, Chicago, Ill., has developed electric furnaces for the melting and refining of steel and other ferrous and non-ferrous metals. Energy is introduced to the furnace through one, two or three main vertical electrodes, the number depending upon whether the furnace proper is to operate single, two or three phase. The furnace is also provided with one auxiliary electrode and with wrought-iron grids, with a refractory facing, which are embedded in the hearth. The auxiliary electrode is inserted vertically through the roof, except in the small furnaces, where it is inserted obliquely through the door opening.



GENERAL LAYOUT OF A TWO-PHASE FURNACE WITH AUXILIARY ELECTRODE, ARCS DRAWN WITH MAIN ELECTRODES

The following explanation is limited to the two-phase furnace, that being the type best suited to the usual power supply and steel-refining conditions. In starting a heat with a cold charge in the two-phase furnace a pawl on the auxiliary electrode holder is released, permitting the auxiliary electrode to rest upon the scrap charge. Arcs are then drawn with the two main electrodes, and the metal begins to melt under the arcs. The auxiliary electrode acts as a common neutral or return, no arc being drawn and therefore no metal melting under the auxiliary electrode. When a molten bath has accumulated upon the hearth, sufficient to make the hearth conductive of electricity, ammeters indicate that current is beginning to flow through the wrought-iron grids. The auxiliary electrode is then withdrawn entirely from the furnace, and the opening through which it enters the furnace is closed up. The furnace then continues to operate with the current entering the furnace through the main vertical electrodes and being carried through the bath and the hearth to the grids, and so out through the grids. The connections from the transformer to the furnace are so arranged that each of the two phases has an independent circuit.

These furnaces are advocated for single-phase, two-phase or three-phase operation, this depending on the local power supply conditions and upon the character of the work for which the furnace will be used. The single-phase furnace is operated by one single-phase transformer connected across one phase of a three-phase line. The two-phase furnace is operated by two single-phase transformers, Scott-connected, thus balancing the load over three phases of the three-phase line. The three-phase furnace is operated by three single-phase transformers, one transformer on each phase of a three-phase line.

Fluted-Catch Pull Switches

The General Electric Company has a complete line of fluted-catch pull switches in 250-watt, 250-volt sizes, including pull switches with side outlets and with bottom outlets and rosette switches with side outlets. These pull switches are furnished with short chains and 10 ft. (3 m.) of linen cord. Extra-length chain guides, insulated chains, etc., can be furnished. The standard finish on these pull switches is old or brushed brass. These switches conform to the National Electrical code standard. The caps and bases of these devices are the same as those used with fluted-catch sockets and receptacles, therefore the caps and bodies are interchangeable with socket shells and interiors.

TWO TYPES OF PULL SWITCHES

Radiant Heating Unit for Electric Irons

The Simplex Electric Heating Company of Cambridge, Mass., has developed a heating unit for use in electric irons which employs the principles of radiant heating and conduction heating. A continuous coil of nickel-chromium resistance wire is suspended between flanges which project from the back of the iron casting that forms the heating surface. The coil is supported by heavy strips of India mica, through which it passes in such a way that the mica strips divide the space between the flanges into compartments that are closed at the top by a plate bolted to the flanged casting. It is pointed out that by this construction the heat is distributed evenly throughout the flanged casting and the suspended coil is free to expand and contract as much as may be necessary without becoming displaced. There are no close bends in the wire and it is possible to use a wire of relatively large diameter. This unit can be applied, it is said, to all flat heating surfaces as irons, ranges, stoves, hot plates, griddles and broilers.

Dust-Proof Lighting Fixture

Lighting fixtures designed, it is claimed, to preserve the initial efficiency of the unit as long as possible and to reduce the cost of maintenance have been produced by Young & Egan, Inc., 489 Fifth Avenue, New York City.

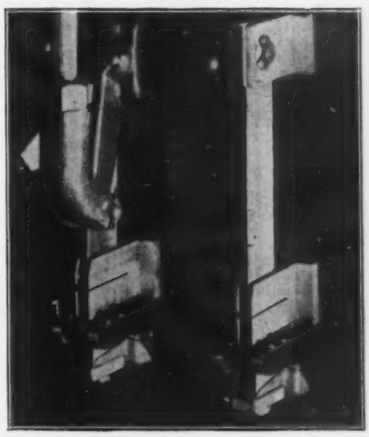
The fixtures consist of a one-piece clear inclosing globe to eliminate dust. A top member is superimposed, consisting of a white opal bowl-shaped reflector, which furnishes direct lighting, and a bottom member which is attached underneath the inclosing globe, securing the semi-indirect feature and at the same time acting as a screen over the source of light.

The top and bottom opal members are separate and can be made in tinted or iridescent glass etched in becoming patterns producing a decorative effect. These separate members can also be made in ruby glass for exit purposes or in blue glass to produce daylight effects.

Back-of-Board-Type Field Switches

In the starting of a synchronous motor from an alternating-current source with the field open-circuited, which is the practice of the General Electric Company of Schenectady, N. Y., on all alternating-current motors using 125-volt excitation, there is considerable induced voltage across the field terminals until the motor reaches synchronous speed. Under these conditions an exposed field switch on the front of a switchboard is more or less a source of danger to the operator.

A method of reducing this danger in connection with hand-operated field switches is by means of a back-of-board switch. It consists of an operating handle similar to an oil-circuit-breaker lever mounted on the front of the board and the switch proper mounted on a slate base which is supported on a framework back of the switchboard. The switch is connected mechanically to the operating handle by means of connecting rods and bell hangers. This brings all live parts on the back of the board and does away with danger to the operator of accidental contact from the front.



WAY OF CONNECTING SWITCH HANDLE

Trade Notes

LANDERS, FRARY & CLARK, New Britain, Conn., have had plans prepared for an addition to their plant, to cost about $35,000.

THE ELECTRIC AUTO-LITE CORPORATION, 244 West Forty-ninth Street, New York, N. Y., has icreased its capital from $13,000,000 to $15,000,000 for expansion.

KERWIN BROTHERS, Oelwein, Iowa, manufacturers of time switches, have appointed the O. B. McClintock Company, 33 Western Avenue, Minneapolis, Minn., their general sales agents.

THE NATIONAL X-RAY REFLECTOR COMPANY, Chicago, announces the appointment of Harvey B. Wheeler as supervising engineer in the Middle Western territory with offices at 120 West Eleventh Street, Kansas City, Mo.

J. W. STJERNSTEDT, manager of the Western Engineering Sales Company of San Francisco, has taken over the Pacific Coast agency for the Thordarson Transformer Company, and will maintain offices in the Rialto Building, San Francisco.

THE GENERAL ELECTRIC COMPANY, Harrison, N. J., has awarded a contract for the construction of a two-story reinforced-concrete addition to its local lamp works, 125 ft. by 250 ft., to Edward M. Waldron, Inc., 665 Broad Street, Newark.

JOSEPH STEINBERGER, president of the General Insulate Company, and Victor Charles Steinberger, manager and secretary of the company, have had their petition to change their family name to Rockhill granted by Judge Cropsey of the Supreme Court.

A. S. LINDSTROM has been appointed general manager of the Thordarson Electric Manufacturing Company of Chicago. Mr. Lindstrom was in charge of the Thordarson exhibit in the Palace of Machinery at the San Francisco Exposition and conducted the experiments with the million-volt transformer which were carried on at that time. Since the Exposition Mr. Lindstrom has represented the Thordarson Company on the Pacific Coast.

THE LACLEDE-CHRISTY CLAY PRODUCTS COMPANY, St. Louis, Mo., has sent a letter to the trade stating that because a number of its salesmen have been called to the colors it has been found necessary to make a temporary redistribution and enlargement of salesmen's territories to a certain extent. For this reason the company has sent to the trade a post card asking when buyers will be in the market for such material so as to conduct as much of its business as possible by mail.

J. E. SLIMP, who has represented the Ohio Brass Company for a number of years, first in the South with headquarters in Atlanta and later in New England with headquarters in Boston, has been transferred to an important position in the home office of the same company at Mansfield, Ohio. L. A. Wilson has been appointed to represent the company in New England. He will make Boston his headquarters. Mr. Wilson has traveled in New England for a number of years in the interests of the lamp department of the General Electric Company.

THE CENTURY ELECTRIC COMPANY of St. Louis, Mo., is just completing a three-story reinforced concrete warehouse containing about 19,000 sq. ft. of floor space and located on a private railroad siding. This additional space will enable the company to handle conveniently the large amount of raw material now required. The warehouse is so arranged that the heavy material, such as electrical sheets, commutator copper, bars of steel, etc., can be handled by electric cranes directly from the cars into the warehouse. Smaller cranes inside the warehouse will handle the smaller lots for distribution to the factory.

WESTINGHOUSE COMPANY MAKES PROMOTIONS IN PURCHASING DEPARTMENT.—Announcement has just been made by the Westinghouse Electric & Manufacturing Company of the promotion of W. J. Longmore, formerly purchasing agent of the company at its East Pittsburgh works, to be general purchasing agent of the company with headquarters at Pittsburgh, where he will have supervision of the purchases of the company as a whole, with special supervision over those involving contracts for material used by both the electric and machine works. Mr. Longmore is a veteran in the employ of the Electric company, having begun service at the Garrison Alley plant in October, 1881, and has been purchasing agent at the East Pittsburgh works since 1892. Charles G. Taylor, formerly assistant purchasing agent, has been promoted to be purchasing agent at East Pittsburgh, where he has headquarters, and also of the Shadyside, Cleveland and Newark works. Mr. Taylor has been in the service of the company since 1887 and has acted as assistant purchasing agent since 1895. A. W. Fullerton, formerly purchasing agent of the Westinghouse Machine Company, which is now known as the machine works of the Westinghouse Electric & Manufacturing Company, has been appointed purchasing agent of the machine works at East Pittsburgh, Trafford and Essington, with headquarters at the first-named place. Mr. Fullerton has likewise been in the employ of the Westinghouse Machine Company for a number of years, having begun work in February, 1899, and has been in charge of the purchasing department for the Machine company since 1915.

New Incorporations

THE MUTUAL HEATING & LIGHTING COMPANY of Toledo, Ohio, has been incorporated by William J. Blebescheimer and others

THE MICHIGAN CHANDELIER COMPANY of Detroit, Mich., has been incorporated with a capital stock of $50 000 by Nathan Silberstein, S. Groosfoeld and others.

THE PALMYRA (ILL.) LIGHT, HEAT & POWER COMPANY has been incorporated, with a capital stock of $10 000, by Lewis M. King, Clarence W. King and Nellie G. King.

THE STEINBOCK ELECTRIC COMPANY of Peekskill, N. Y., has been incorporated by H. E. Steinbock, Claude J. Holslag and Christian Jetter. The company proposes to manufacture electric welding apparatus.

AUSTIN & MOORE, INC., of Queens, N. Y., have filed articles of incorporation, with a capital stock of $10,000, to do a general electrical contracting business. The incorporators are: William F. Austin, E. Moor and L. Siemering.

THE COMBINATION LIGHTING UNIT COMPANY of Pittsburgh, Pa., has been chartered by S. V. Reed, W. S. Wells and David Evans, all of Pittsburgh, Pa. The company proposes to manufacture and sell all kinds of lighting fixtures.

THE NEW DEVICES COMPANY of Newark, N. J., has been incorporated with a capital stock of $10,000 to manufacture vacuum cleaners, etc. The incorporators are: B. N. Bishop, Richard Deubich of Newark and Louis Caper of Plainfield.

THE MOUNT FIRE ALARM CORPORATION of New York, N. Y., has been incorporated by Charles B. Mount, Thomas L. Dillon and Fred C. Wendland. The company is capitalized at $300 000 and proposes to do a general electrical and mechanical engineering business.

THE TRANSCOM LIGHTING PRODUCTS CORPORATION of New York, N. Y., has been chartered, with a capital stock of $5 000, by W. L. and E. S. Powers and R. S. Hart, 115 Lenox Street, Brooklyn, N. Y. The company proposes to manufacture lighting fixtures, electrical apparatus, etc.

THE AMERICAN ELECTROTHERMIC SMELTING CORPORATION of New York, N. Y., has been incorporated with a capital stock of $100 000, by M. F. Conner, Jr., F. A. Collins and J. L. Covey, 568 West 149th Street, New York, N. Y. The company proposes to do a general mining business.

THE ELECTRIC STEEL & ENGINEERING COMPANY of Welland, Ont., has been chartered with a capital stock of $2 000 000 by James S. Lovell, 119 Madison Avenue; Charles D. Magee, 300 St. George Street; William Bain, 189 College Street, and others, all of Toronto. The company proposes to manufacture iron, steel, machinery, tools, etc.

THE EASTERN NEVADA POWER COMPANY has filed articles of incorporation under the laws of the State of Delaware, with a capital stock of $4,000.000, for the purpose of generating and distributing electricity for lamps, heaters and motors. The incorporators are: F. D. Buck, M. L. Horty and M. W. Noblit, of Wilmington, Del.

THE PUGET SOUND CORPORATION of Olympia, Wash., has been incorporated by A. P. Gilles of Olympia; A. C. Lindsay, P. H. Hoag and A. C. Phillips, all of Chicago, Ill. The company is capitalized at $5,000,000, and proposes to build steel ships and machinery, own and operate power plants and engage in general manufacturing business.

THE CONNECTICUT ENGINEERING & METAL PRODUCTS COMPANY of Greenwich, Conn., has been incorporated with a capital stock of $10,000 by Raymond M. Boden of Waterbury, Ambrose M. Boles of Greenwich, Conn., and Charles C. Schoen of New York, N. Y. The company proposes to manufacture metal specialties and electrical goods.

THE WISCONSIN ENGINE & DYNAMO COMPANY of Milwaukee, Wis., has been incorporated by John I. Beggs, W. H. Cameron and Chester B. Pierce of Milwaukee. The company proposes to establish a plant in Milwaukee or suburbs to manufacture electrical machinery and equipment. Offices have been opened in the First National Bank Building, Milwaukee.

THE NORTHWESTERN BATTERY COMPANY of Milwaukee, Wis., has been incorporated, with a capital stock of $40,000, to take over the business of the Northwestern Storage Battery Company and the Willard Service Battery Company. The incorporators are: C. B. Pierce, W. H. Cameron and J. H. Gugler. A new station has been erected on the old Peter Vachten property on Jefferson Street.

THE LEHIGH POWER SECURITIES CORPORATION has filed articles of incorporation under the laws of the State of Delaware, with a capital stock of $60,500,000. This company has taken over the control of the properties formerly controlled by the Northern Central Company and also acquired the control of the Lehigh Valley Transit Company of Allentown, Pa., and the Lehigh Navigation Electric Company of Hauto, Pa.

Trade Publications

BUCKETS.—The Blaw-Knox Company of Pittsburgh, Pa., is distributing a leaflet descriptive of its "Bulldog" bucket.

CONDUIT SPECIALTIES.—M. B. Austin & Company of Chicago are distributing a leaflet descriptive of conduit unions, adapters, beam clamp conduit supports, bushings, steel lock-nuts, nipples, fixture studs, etc.

FACTORY LIGHTING.—"The Need for Better Factory Lighting" is the title of a new bulletin by the National Lamp Works of the General Electric Company, Nela Park, Cleveland, Ohio. The object of this bulletin is to summarize in an unbiased way the reasons for good lighting and to illustrate good lighting in representative plants by unretouched photographs taken at night with no other means of illumination than those in use in each plant.

ELECTRIC HEATING DEVICES.—The Hughes Electric Heating Company of Chicago has issued its 1917 catalog covering its entire line of heating devices. Electric bake ovens, electric ranges, industrial ovens, hot-plates, portable ovens, air heaters and hotel kitchen equipment, including large electric toasters, broilers, plate warmers, frying griddles and coffee urn heaters, are described and illustrated. Complete specifications and selling points are also included.

SINGLE-PHASE MOTORS.—The Century Electric Company, St. Louis, has issued bulletin 24, describing, illustrating and suggesting applications for its single-phase motors between 0.1 hp. and 40 hp. in size. Considerable effort is made to draw attention to the fact that the company's repulsion-start, induction-type motors possess characteristics with more desirable relations between starting torque and starting current than any other types of single-phase motors.

RAILWAY SUPPLIES.—Reprint No. 56, descriptive of the Norfolk & Western electrification from the railroad viewpoint, is being distributed by the Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa. Other recent bulletins by this company are on No. 506 "Wee" railway motor, type SK direct-current commutating-pole generators, No. 514 "Baby" railway motors, No. 333-V-2 railway motors, No. 532-B railway motors and type 810 drum reverse switches.

FIRE PREVENTION. — The National Board of Fire Underwriters, 76 William Street, New York City, has prepared for the Council of National Defense a bulletin entitled "Safeguarding Industry." It includes a brief review of the present safety needs of large and small plants and other industrial institutions. They have been considered in their simple and non-technical phases, from the standpoint of such common-sense observations as may be exercised by any one of intelligence. More technical rules are also taken up.

New England States

RUTLAND, VT.—Foundations for a 1000-hp. waterwheel are being built at the East Pittsford power station of the Rutland Railway, Light & Power Company. This will increase the output of the station to 4000 hp. Machinery has already been purchased.

BROCKTON, MASS.—Bids will be received at the office of the Sewerage Commissioners, City Hall, Brockton, Mass., until Sept. 6 for furnishing three fuel oil engines, three centrifugal pumps, two oil storage tanks, with all necessary piping, etc. Plans, specifications, etc., may be obtained at the above office. Albin F. Nordbeck is chairman.

CHICOPEE, MASS.—Contract for alterations in the power plant of the National Scale Company at Chicopee has been awarded to the Ernest F. Carlson Company. Improvements include the installation of a new fire pump, for which contract has been awarded to the Holyoke Supply Company.

FITCHBURG, MASS.—The Saima Society, also known as the Finnish Socialist Club, has decided to install an electric-light plant at its farm near Rindge and Scott Roads and to Ashby line. The proposed plant will have sufficient output to maintain 150 lamps. Both arc and incandescent lamps will be used.

MILFORD, MASS.—The Milford & Uxbridge Street Railway Company has decided to purchase energy to operate its system from the New England Power Company. The local plant, which furnishes nearly all of the motive power, will be closed down. It will be kept intact for use in case of emergency

NEWPORT, R. I.—Plans are being prepared for a new power plant at the Naval Torpedo Station at Newport, for which an appropriation has been made.

NEW HAVEN, CONN.—The Public Utilities Commission has granted the Connecticut Company permission to erect power cables along the New Haven-North Haven line through Montowese. These transmission lines will be equipped for transmitting energy at 11,000 and 33,000 volts.

NEW HAVEN, CONN.—The Public Utilities Commission has approved the petition of the Rocky River Power Company for permission to purchase the properties of the Housatonic Power Company of New Haven, the United Electric Light & Water Company of Waterbury and the Seymour (Conn.) Electric Light Company. The price is understood to be $6,600,000. The consolidated companies will be known as the Connecticut Light & Power Company.

NEW LONDON, CONN.—Plans are being prepared by the Bureau of Yards and Docks, Navy Department, Washington, D. C., for a power plant and distributing system to cost about $450,000 at New London, Conn.

Middle Atlantic States

ALBANY, N. Y.—Bids will be received by Dr. Herman M. Biggs, commissioner of health, Department of Health, Albany, until Sept. 7 for construction, including heating, sanitary and electric work, for laboratory building, Division of Laboratories, State Department of Health, Albany. Drawings and specifications may be consulted at the New York office of the Department of Architecture, Room 1224, Woolworth Building, and the Department of Architecture, Albany. Lewis F. Pilcher, Capitol, Albany, is State architect.

BROOKLYN, N. Y.—The Interborough Rapid Transit Company is planning to build a new substation, 50 ft. by 100 ft., on Nostrand Avenue, to cost about $50,000.

ELMIRA, N. Y.—The construction of a substation, 40 ft. by 40 ft., to cost about $10,000, is under consideration by the Elmira Foundry Company. A new boiler house, to cost about $35,000, will be erected.

GENEVA, N. Y.—Contract has been awarded by the Geneva Cutlery Company for the construction of a new one-story power house, 60 ft. by 125 ft., at its factory at Torrey Park.

JAMESTOWN, N. Y.—The application of the Panama Traction Company to issue $60,000 in capital stock and $150,000 in bonds has been approved by the Public Service Commission. The proceeds will be used to construct the first section of the proposed railway between Ashville and Panama. The railway when completed will connect the Lake Shore Railway at Erie with the steamer service at Chautauqua Lake points.

LOWVILLE, N. Y.—No decision has yet been reached regarding the ornamental lighting installation. The local utility insists on a sum of $6,400, while the town board refuses to go higher than $5,940.

Construction

News of Projects, Plans, Bids and Contracts. Notes on Work Under Way

MONROE, N. Y.—The Public Service Commission has granted the Orange & Rockland Electric Company permission to issue $163,500 in capital stock, the proceeds to be used for extensions and improvements.

NEW YORK, N. Y.—Plans have been completed by the Fifth Avenue Coach Company, 10 East 102d Street, for the construction of a new plant, four stories, at Broadway and 132d Street, for the manufacture of motor buses. R. A. Meade is president.

NIAGARA FALLS, N. Y.—Plans have been prepared for an addition to the factory of the Oldbury Electrochemical Company, Buffalo Avenue and Industrial Railroad, Niagara Falls.

ROCHESTER, N. Y.—Contract has been awarded by the J. Hungerford Smith Company, 410 North Goodman Street, Rochester, for the construction of an engine and boiler house.

ROCHESTER, N. Y.—The North East Electric Company, it is reported, has awarded contract for the construction of a new machine shop at Orchard Street and Lyle Avenue, to cost about $15,000.

SYRACUSE, N. Y.—Work has been started on the erection of additional electric lamps in the various parks in Syracuse, according to Commissioner of Parks Frank Westcot. Three large arc lamps will be placed near the pool and drive in both Onondaga and Burnet Parks.

BAYONNE, N. J.—The City Commission has granted the Public Service Electric Company permission to extend its conduit system in a number of city streets. Improvements will be made to the street-lighting system in lower Broadway.

ELIZABETH, N. J.—Plans are being considered by the Diehl Manufacturing Company for extensions to its plant, but as yet definite arrangements have not been completed. The company manufactures electrical apparatus.

HOPEWELL, N. J.—Arrangements have been made by the Public Service Electric Company with the Borough Council for improvements to the street-lighting system, including the installation of larger lighting units.

JAMESBURG, N. J.—Plans have been made by the board of managers of the State Home for Boys at Jamesburg for the installation of new equipment for power plant at the institution.

NEWARK, N. J.—The Public Service Electric Company is planning to build a new switching station at its Essex power plant.

UNION HILL, N. J.—The Town Council has approved an ordinance authorizing an expenditure of $23,000 for the police and fire telegraph alarm system. An appropriation of $14,700 has also been authorized for street lighting during the coming year.

VENTNOR CITY (P. O. ATLANTIC CITY), N. J.—The City Council has rejected the bids submitted for a new street-lighting system. New specifications designed as asked in the estimates, which it is understood will include gas standards, will be asked for.

EAST BRADY, PA.—The Rex Hide & Rubber Company is planning to build a new power plant in connection with its proposed factory building to be erected at East Brady. The W. E. Moore Company, Union Bank Building, Pittsburgh, has charge of the engineering work.

GLENOLDEN, PA.—Plans have been prepared for the erection of a power house, garage and stable at Glenolden for the H. K. Mulford Company.

HALIFAX, PA.—The Millersburg Electric Light, Heat & Power Company has recently completed the erection of an electric transmission line from Millersburg to Halifax and is considering extending its lines to Millerstown, Newport and neighboring districts.

HARRISBURG, PA.—The Bell Telephone Company is contemplating the erection of a new telephone line to Paxtang, to cost about $12,000.

HARRISBURG, PA.—Plans are being considered by the City Electrical Department for the installation of underground conduit lines in the Capitol Park district to replace the present overhead system.

HARRISBURG, PA.—Work has begun on the installation of a new police and fire-alarm telegraph system. New underground conduits will be installed to eliminate the overhead wires in Court, Briggs, Cowden and other streets.

LANCASTER, PA.—The installation of a new street-lighting system in the business district is under consideration.

LEBANON, PA.—The new 33,000-volt transmission line of the Metropolitan Electric Company, now in course of construction from its West Reading power station to Lebanon, will soon be placed in operation. It is planned to use the local plant for a substation upon completion of the new line.

LEWISTON, PA.—The Union Light, Heat & Power Company, it is reported, has applied to the Public Service Commission for permission to operate in a section of Union Township.

MEDIA, PA.—The Philadelphia & West Chester Traction Company is contemplating extending its Collindale line to the Sharon Hill section.

MERCER, PA.—The Borough Council has accepted the contract of the Mercer County Light, Heat & Power Company for street-lighting for a period of two years. The contract calls for an initial installation of 85 lamps of 60 cp.

PHILADELPHIA, PA.—The United States government will make extensions to the power plant of the Frankford Arsenal, to cost about $100,000.

PHILADELPHIA, PA.—Plans are being considered by the Philadelphia & Reading Railroad Company for the construction of a new power plant, together with a new coaling station at its Philadelphia yards.

PITTSBURGH, PA.—The Duquesne Light Company is contemplating an addition, 25 ft. by 25 ft., to its substation.

POTTSVILLE, PA.—Work has begun on the construction of a new addition to the electric power plant of the Philadelphia & Reading Coal & Iron Company at Bear Valley. The equipment will include a 250-volt direct-current generator.

POTTSVILLE, PA.—The Eastern Pennsylvania Railways Company is planning to erect a new one-story addition, 75 ft. by 100 ft., to its repair shops at Palo Alto. Plans are also being made for the construction of a new power plant in Palo Alto to replace the one recently destroyed by fire. The work will be in charge of the J. G. White Engineering Corporation, 43 Exchange Place, New York, N. Y.

SHAMOKIN, PA.—The Pennsylvania Lighting Company of Shamokin, it is reported, will be consolidated with the Edison Electric Illuminating Company of Mount Carmel, which was recently taken over by interests represented by Chandler & Company of Philadelphia. Extensions, it is understood, will be made to the plants and systems. The new company will operate in Mount Carmel, Shamokin, Locust Gap, Kulpmont and vicinity.

TUNKHANNOCK, PA.—Plans are being considered for the improvement of the lighting system in Tunkhannock, Pa. It is planned to install Westinghouse 60-cycle, 110-volt direct-current machines.

UPPER DARBY, PA.—The contract for electrical work in the new school has been awarded by the board of education to the Wyoming Electric Company.

WILKES-BARRE, PA.—The Wilkes-Barre Light Company has been awarded the contract for all the city lighting. The contract is for five years.

WILMINGTON, DEL.—Contract has been awarded by the William Freihofer Baking Company, North Twentieth Street and Indiana Avenue, Philadelphia, Pa., for the construction of a one-story concrete power plant at its baking establishment to be erected at Wilmington, Del., to cost about $75,000.

BALTIMORE, MD.—The Consolidated Gas, Electric Light & Power Company has filed a petition with the Public Service Commission for authority to exercise the franchises of the Baltimore Power Company, the corporation which was organized by consolidated interests as a medium through which to handle new financing.

BALTIMORE, MD.—Plans are being prepared by the Chesapeake & Potomac Telephone Company for the construction of a new three-story exchange building on Bridge Street, Elkton, to cost about $10,000. Extensions and improvements are also contemplated to the system at Fairmont, W. Va., involving an expenditure of about $200,000.

GARY, W. VA.—The United States Coal & Coke Company is planning for the installation of electrical equipment at its properties in Harlan County. H. N. Eavenson, chief engineer.

RICHMOND, VA.—The construction of a new power plant at the Virginia Medical

College is reported to be under consideration. Nolan & Baskerville, Travelers Building, are architects.

WASHINGTON, D. C.—The power house of the Washington & Old Dominion Railway Company at Rosslyn will be closed and energy will be purchased from the Potomac Electric Power Company to operate the system.

WASHINGTON, D. C.—Sealed proposals will be received at the Supervising Architect's Office, Washington, D. C., until Sept. 13, 1917, for furnishing and installing lighting fixtures in the United States post offices at Barnesville, Ga.; Bartow, Fla.; Bay City, Tex.; Beeville, Tex.; Deland, Fla.; Dickinson, N. D.; Eureka Springs, Ark.; Franklin, Va.; Marion, S. C.; Macon, Miss.; Rockville, Conn., and Stamford, Tex. James A. Wetmore, acting supervising architect. (For details see Searchlight Section.)

WASHINGTON, D. C.—Sealed proposals will be received at the office of the general purchasing officer of the Panama Canal, Washington, D. C., until 10:30 a. m., Aug. 31, for furnishing among other things electric hoists and trolleys. Blanks and information relating to this circular, No. 1160, may be obtained from that office or the offices of the assistant purchasing agents, 24 State Street, New York City; Audubon Building, New Orleans, La., and Fort Mason, San Francisco, Cal.; also from the United States engineer offices in the principal cities throughout the United States. Earl I. Brown, Lieut. Col., Corps of Engineers, U. S. A., general purchasing officer.

North Central States

LANSING, MICH.—Engineers B. E. Parks & Son have prepared plans for a ten-panel light and power oil switchboard for the Prudden power plant, Lansing, Mich., and awarded the contract to the Allis-Chalmers Manufacturing Company.

CINCINNATI, OHIO.—The Utilities Commission has authorized the Cincinnati Gas & Electric Company to issue $2,500,000 in bonds, the proceeds to be used to complete a power plant being erected on the Ohio River.

CINCINNATI, OHIO.—The City Council has authorized Service Director Hornberger to advertise for bids for the installation of ornamental lamps on Third Street from John Street to Central Avenue and on Central Avenue from Third Street to Twelfth Street.

COLUMBIANA, OHIO.—The Youngstown & Suburban Railway Company is contemplating improvements to its local system, which include the construction of a substation, new depot, etc. Electrical machinery, it is understood, has been purchased. Energy will be supplied from Salem, where a power house will be erected for the purpose, to be used instead of the one at West Point. A branch road will be built from East Palestine to connect with the Youngstown & Suburban Railway in Columbiana.

COLUMBUS, OHIO.—Bids will be received by the Auditor of State, Columbus, Ohio, until Sept. 4 for furnishing material and construction of power house on the campus of the Ohio State University. Plans are on file at the office of the auditor and the Builders' Exchange, Columbus.

COLUMBUS, OHIO.—Bids are being asked by the Board of Purchase, City Hall, Columbus, for equipment for the municipal lighting system as follows: 270 street-lighting fixtures, 22 regulators and 23 control panels in accordance with plans and specifications on file in the office of the consulting engineer, 421 New First National Bank Building. George A. Borden is president.

ELYRIA, OHIO.—The Lorain County Electric Company has accepted the 25-year franchise granted by the City Council recently. The franchise provides for an improved lighting system on Middle Avenue, a sliding scale of prices for private consumers and a reduction in the price of arc lamps.

MARION, OHIO.—Orders have been placed by the Columbus, Delaware & Marion Electric Company for equipment and material for enlarging and rebuilding its distributing system in Marion, at a cost of about $35,000. The company is now installing a steam turbine, water-cooling tower, boilers, etc., at its plant on Mill Street, to cost approximately $125,000. Improvements on the local plant and system, to cost about $125,000, are contemplated during 1918.

NEW BREMEN, OHIO.—The capital stock of the New Bremen Telephone Company has been increased from $20,000 to $30,000.

NEW PHILADELPHIA, OHIO.—Two 500-hp. boilers are being installed in the local plant of the Ohio Service Company. A new turbine was recently installed. The company has secured a contract to supply the Greer Steel Company of Dover with electricity and will also furnish energy to operate a 2000-kw. electric furnace to be installed at the Reeves steel mill.

TIPPECANOE CITY, OHIO.—The Village Council is considering a proposal from the Dayton Power & Light Company to take over the local municipal electric-light plant and furnish electrical service in Tippecanoe City.

CAPITO, KY.—The power house of the Atlas Coal Mining Company, it is reported, was recently destroyed by fire, causing a loss of about $7,500, with about $4,000 insurance.

HAZARD, KY.—The Kentucky River Power Company is contemplating extending its electric transmission lines within the next few months into the Whitesburg district to supply electricity to the coal fields there.

KIRKSVILLE, KY.—Plans have been completed by the United States government for the construction of a one-story power plant at its Kirksville station.

ELKHART, IND.—Plans are being prepared by the Foster Machine Company for the construction of building, 128 ft. by 132 ft., to provide space for its power plant. The company will also construct another building, 132 ft. by 165 ft., which will be used as a storeroom for raw material.

CHICAGO, ILL.—A permit has been granted to the Commonwealth Edison Company for alterations to its power house at Twenty-second and Fiske Streets, to cost about $200,000; also for construction of a one-story locomotive house, to cost $25,000, and a concrete ash pit, to cost $11,000, at the same location.

EAST ST. LOUIS, ILL.—The Broderick-Bolte Electrical Company has been awarded the contract for the installation of electrical work in the three new school buildings which will be erected in East St. Louis, Ill.

PALMYRA, ILL.—The Palmyra Light, Heat & Power Company, recently organized with a capital stock of $10,000, is planning to install a steam generating electric power plant. Lewis W. King, C. W. King and others are interested in the company.

ROCKFORD, ILL.—The Rockford & Interurban Railway Company is planning to extend its electric railway to Camp Grant.

CHIPPEWA FALLS, WIS.—Plans are being prepared by the Chippewa Valley Auto Company for the erection of a public garage and service building, at Columbia and Bay Streets, to cost about $50,000. Contracts, it is understood, will be awarded about Sept. 1.

MADISON, WIS.—The Wisconsin Railroad Commission has granted the Wisconsin Interurban Company permission to issue $600,000 in bonds, the proceeds to be used for the construction of an electric railway from Portage to Madison. Contract for constructing and equipping the proposed railway, it is reported, has been awarded to John T. Adams of Columbus, Ohio. J. E. Jones of Portage is president.

MILWAUKEE, WIS.—The Pawling & Harnischfeger Company of Milwaukee has awarded contract for the construction of an addition to its power plant 50 ft. by 85 ft., to provide space for the installation of a 500-hp. unit. Contracts have been awarded for machinery. Woodmansee & Davidson, Chicago, Ill., and Milwaukee, are engineers.

MILWAUKEE, WIS.—The controlling interest in the Wisconsin Power, Light & Heat Company has been purchased by Samuel Insull of Chicago, Ill., and associates. The Wisconsin company holdings include public utilities in 27 towns and cities in Wisconsin, embracing power plants and transformer systems; also power dams at Kilbourn and Prairie du Sac, as well as 107 miles of transmission lines now under construction.

MONTICELLO, WIS.—The City Council is considering an issue of $5,650 in bonds, the proceeds to be used for improvements and extensions to the municipal electric-lighting system.

WAUSAU, WIS.—Contract, it is reported, has been awarded by the Wisconsin Valley Electric Company to the Allis-Chalmers Manufacturing Company of Milwaukee for furnishing and installing an auxiliary steam generating plant, including a steam turbine, Heine boilers, and Westinghouse automatic stokers. The plant will have an output of 1500 kw. and will cost between $90,000 and $100,000.

MINNEAPOLIS, MINN.—A power house to cost about $9,000 will be erected by the Minneapolis Steel & Machinery Company at 3210-3216 Snelling Avenue, Minneapolis, Minn.

VIRGINIA, MINN.—The Mesaba Railway Company contemplates replacing the wooden poles now in use with steel towers.

VIRGINIA, MINN.—The water and light commission, it is reported, will advise against the construction of a heating plant at the present time, owing to the abnormal prices of construction material.

CEDAR VALLEY, IOWA.—The Cedar Valley Electric Company is planning extensive repairs to its dam.

SIOUX CITY, IOWA.—Work has begun on the construction of boiler house, to cost about $50,000, for the Sioux City Gas & Electric Company.

CLAYTON, MO.—At a special election held recently the proposal to grant the West St. Louis Water & Light Company of St. Louis a 20-year extension to its franchise was carried. In return for this the company agrees to make a reduction of 25 per cent in its water rates in this district.

GOWER, MO.—At an election held recently the proposal to issue bonds for the installation of a municipal electric-light plant was carried.

RUGBY, N. D.—The Northern States Power Company, Minneapolis, Minn., recently purchased a light plant at Rugby, N. D., from the Northern Telephone Company and is now operating the plant. Plans are under way to change the plant from direct-current to alternating-current operation at once.

ISABEL, S. D.—The installation of an electric-light plant in Isabel is reported to be under consideration.

MINOT, S. D.—The Northern States Power Company expects to build a new power plant next year at Minot.

PENDER, NEB.—At an election to be held Aug. 28 the proposal to issue $16,500 in bonds for extensions to the municipal electric-light plant will be submitted to the voters.

INDEPENDENCE, KAN.—The installation of an ornamental lighting system in the principal streets of the city is under consideration.

KANSAS CITY, KAN.—Bids have been asked by the Water and Light Department for two boilers to be installed in the municipal electric-light plant. The cost is estimated at about $60,000. L. H. Chapman is commissioner.

McCRACKEN, KAN.—Work is progressing rapidly on the construction of the municipal electric-light plant in McCracken.

Southern States

HIGH POINT, N. C.—The city of High Point has decided to install an electric-generating plant to maintain the municipal electric-lighting system. Definite plans have not yet been decided upon. Energy is now purchased from the North Carolina Public Service Company.

ROXBORO, N. C.—Improvements are contemplated by the Little River Manufacturing Company, including the rebuilding of its power dam and other improvements in its power system.

SOUTHPORT, N. C.—The Town Council is considering the construction of a municipal electric-light plant.

ATLANTA, GA.—A resolution providing for a special appropriation of $30,000 for the completion and operation of a power plant at the Georgia School of Technology was adopted.

COLUMBUS, GA.—It is reported that an expenditure in the neighborhood of $200,000 will be made in improvements on the Second Avenue plant of the Columbus Power Company. Plans are partly completed for the installation of a new 6000-kw. turbo-generator with necessary additional boilers.

DUBLIN, GA.—Plans are being considered for increasing the output of the municipal electric-light plant to meet the increasing demand for electrical service.

DELAND, FLA.—The Deland Electric Light & Power Company has been granted a franchise to furnish electricity here for a period of 30 years.

NASHVILLE, TENN.—The City Commissioners will order an election for Sept. 27 to vote on $55,000 of bonds to install boilers in the local electric light plant.

PULASKI, TENN.—The Pulaski Electric & Water Company, recently incorporated, is contemplating the construction of an electric-light plant.

MONTGOMERY, ALA.—The Montgomery Light & Traction Company is planning to double-track its railway from Montgomery to Pickett Springs, a distance of 6 miles.

FREDERICK, OKLA.—The city of Frederick is considering the purchase of one 250-hp. steam engine and one centrifugal, two-stage pump directly connected to motor, to have a maximum capacity of 20,000 gal. per hour; also one pump of same capacity, either steam plunger or turbine type. For details see Searchlight Section.

GUTHRIE, OKLA.—The Oklahoma Railway Company has secured a right-of-way within the city limits of Guthrie. The ground acquired will be used for trackage and a direct line in and out of the city and for terminal purposes.

RINGLING, OKLA.—Plans are being prepared by the People's Refining Company, E. D. Smith manager, Insurance Building, Oklahoma City, Okla., for the construction of a refinery, including four boiler stills and one steam still, two 125 hp. boilers, two underground storage tanks, seven steam pumps and power house, to cost about $65,000.

DALLAS, TEX.—The Dallas Southwestern Traction Company has awarded the contract for the construction of 49 miles of its proposed interurban electric line between Dallas and Cleburne to the Cherokee Construction Company of Sapulpa, Okla. The contract calls for an expenditure of $2,500,000. The survey was made some time ago and the right-of-way has all been obtained. The route of this first division of the road is through Eagle Ford, Irving and other towns.

SAN BENITO, TEX.—The local electric-light plant, it is reported, has been purchased by J. T. Lomax.

TEMPLE, TEX.—The Texas Power & Light Company has submitted a proposal to local business men offering to install an ornamental lighting system in the business section. The cost is estimated at about $12,000, which the company will assume.

Pacific and Mountain States

BREMERTON, WASH.—At an election to be held on Sept. 18 the proposal to purchase the local electric-light and power plant, to be owned and operated by the municipality, will be submitted to the voters.

DEIRINGER, WASH.—A franchise for a power line straight from the Deiringer power plant to Tacoma to be used in an emergency has been granted to the Puget Sound Traction, Light & Power Company by the Board of County Commissioners.

EPHRATA, WASH.—The Grant County Power Company has petitioned the Board of County Commissioners for a franchise to erect and operate an electric power transmission line in Grant County.

OLYMPIA, WASH.—The State Board of Control awarded the contract for the construction of a power house at the State Insane Asylum at Sedro Woolley to Warrack Construction Co., Arcade Bldg., Seattle, for $24,200. The improvement includes the construction of a 140-ft. concrete smokestack 11 ft. in diameter at the base and 6 ft. at the top. All bids for the boilers were rejected as too high and new bids will be called for.

SEATTLE, WASH.—The City Council has passed an ordinance authorizing the employment of J. L. Stannard, civil engineer, to investigate the possibility of Cedar River electric power development.

SEATTLE, WASH.—William D. Freeman, city purchasing agent, will receive bids until Aug. 31, 1917, for furnishing 4000 alternating-current wattmeters. Each bid to be accompanied by check for $1,000. C. B. Bagley, secretary of Board of Public Works.

TACOMA, WASH.—C. F. Peterson of Seattle has offered the City Council an opportunity to buy the Cle Elum Halls power site, which is within the boundaries of Wenatchee forest reserve. No action will be taken until further information is received.

TACOMA, WASH.—The County Commissioners have granted the Puget Sound Electric Company a franchise to erect an electric transmission line from the Dieringer power plant to Tacoma. The proposed new line will be held in reserve for use in emergencies.

WHITE SALMON, WASH.—Ordinance No. 49 has been passed by the City Council granting a franchise to the Pacific Power & Light Company to maintain, construct and operate in White Salmon electric light and power lines, for the purpose of supplying the town with electricity. The franchise will run for a period of fifty years. C. H. Estes, clerk.

BAKER, ORE.—Repairs to the Fremont plant of the Eastern Oregon Power & Light Company will be made immediately to remedy damage done in recent fire. Loss amounted to $6,000, with little damage to the machinery.

MARSHFIELD, ORE.—Charles Craine, formerly of Baltimore, is having a survey made of the Golden Falls property, near this city, with a view to developing a hydroelectric plant. Only preliminary work has been done so far. It is possible that both Silver Falls and Golden Falls will be developed.

PORTLAND, ORE.—The County Commissioners of Pierce County are considering the installation of electric lighting on the ferryboats. The report of H. H. Pickering, county electrician, was referred to Francis Capell, superintendent of bridges and ferries.

ROSEBURG, ORE.—Among the improvements contemplated by the Douglas County Water & Light Company during the coming year is the construction of a 185-ft. retaining wall 20 ft. high at Winchester, to protect the power plant from the wash of the river. The cost of the wall is estimated at $5,000.

FRESNO, CAL.—Application has been made to the State Railroad Commission by the Merced Stone Company of San Francisco and the San Joaquin Light & Power Corporation of Fresno asking for authority for the Stone company to sell its electric plant in Mariposa and Merced Counties to the San Joaquin company for $35,000.

GLENDALE, CAL.—An election will soon be held for the purpose of forming a new public highway lighting district, to be known as the Verdugo Lighting District of Los Angeles County.

LA GRANGE, CAL.—The State Railroad Commission has granted the Yosemite Power Company permission to sell its property in the La Grange division, which includes La Grange, Turlock, Waterford, Hughson, Ceres, Keyes, Hickman and Denair, to the Sierra & San Francisco Power Company at $450,000.

LOS ANGELES, CAL.—The plan for the new lighting system on Broadway from the tunnel to Tenth Street was adopted by the City Council.

LOS ANGELES, CAL.—The new plant of the Los Angeles Shipbuilding & Dry Dock Company in the outer harbor district, Wilmington, is nearing completion. Work will begin at once on the erection of a power house, about 100 ft. by 200 ft., for plant operation. Fred L. Baker, president of the Baker Iron Works, 950 Broadway, is president and treasurer.

MILL VALLEY, CAL.—A communication has been received from the Pacific Gas & Electric Company calling attention to the advisability of arranging for an electrolier system of lighting streets by laying conduits while the present street improvement is being made. Action is now being taken.

OAKLAND, CAL.—The Oakland, Antioch & Eastern Railway Company and the Western Pacific Railroad Company, it is reported, have entered into an agreement whereby the latter will finance the construction of a branch line by the latter to tap Suisun and the Vaca Valley, which it is understood will extend from a point on the Oakland, Antioch & Eastern main line near Montezuma to Suisun, where connections will be made with the Vaca Valley and Suisun branch of the Northern Electric Railway. The cost of the proposed line is estimated at about $500,000.

RIVERSIDE, CAL.—The Southern Sierras Power Company has applied to the California Railroad Commission for permission to operate in San Bernardino, Riverside, Kern and Inyo Counties.

PETALUMA, CAL.—The Town Council has decided not to appropriate money for an electrolier system at the present time. The installation was for Kentucky Street and was estimated to cost in the neighborhood of $1,800.

STRATFORD, CAL.—A petition has been filed in the office of the County Clerk for presentation to the Board of Supervisors asking for the formation of an assessment district to provide a lighting system for the town of Stratford.

ZAMORA, CAL.—A movement has been started by the Board of Trade to secure an electric-lighting service for Zamora. Six pumping plants are planned for irrigation of the Zamora district if the service is secured. The Pacific Gas & Electric Company, it is reported, is considering extending its transmission lines from Woodland, a distance of 14 miles, to furnish electricity here.

GERALDINE, MONT.—The new electric-lighting plant being erected by the Geraldine Electric Company is nearly completed. A lighting improvement district has been created in the business section of the town.

KALISPELL, MONT.—The city has renewed its contract with the Northern Idaho & Montana Power Company for furnishing it with light in districts Nos. 1 and 2. Contract will run for a period of thirty-five months, at the price of $3 a post a month, the same rate that has heretofore prevailed. Under the contract, the city pays one-third of the cost and the property owners two-thirds.

TERRY, MONT.—The City Council has ordered installation of an electric lighting system in the city. Light will be placed at street intersections, the lamps being hung in the center from poles and to be of 100-watt size. The lighting system will later be improved by the installation of posts along the streets.

WHITEFISH, MONT.—Plans for installing cluster lightings on Central Avenue and Second Street are being considered.

BESSEMER, COL.—Plans are being considered for the installation of an ornamental lighting system on Northern Avenue.

VIRGINIA CITY, NEV.—The Nevada Valleys Power Company of Lovelocks has applied for a franchise to operate in Nevada County.

LAS CRUCES, N. M.—The construction of an interurban electric railway from Las Cruces to El Paso, a distance of 44 miles, it is reported, is being promoted by H. M. Gray of Las Cruces, and associates. Financial arrangements, it is said, have been made, and work will begin as soon as the survey is completed and the right of way obtained.

Canada

PRINCETON, B. C.—The Canada Copper Company, owner of the British Columbia Copper Company, contemplates the construction of a concentrating plant of 3000 tons daily capacity, involving an expenditure of $2,000,000. The proposed improvements will include the construction of a hydroelectric plant and a 12-mile railroad spur from Princeton to Copper Mountain.

LAWRENCETOWN, N. S.—The Town Council contemplates an electric light plant for water power, involving the construction of dam and flume to cost $5,000.

AMERANTH, ONT.—The hamlets of Waldemar and Laurel have petitioned the Hydro-Electric Power Commission for electrical service for the two hamlets and farms adjacent to each. This service will probably be furnished either from Grand Valley substation or by means of an outdoor pole-type substation located in the township.

COOKSTOWN, ONT.—A by-law providing an appropriation of $9,500 for transmission and furnishing electricity in Cooks-town will be voted on.

DERBY, ONT.—The township officials have entered into an agreement with the Hydro-Electric Power Commission of Ontario for electrical service.

LONDON, ONT.—The contract for electrical work for the tuberculosis hospital, to cost $100,000, for the London Health Association has been awarded to the Hydro Commissioners.

MOOREFIELD, ONT.—A bylaw has been passed and tenders will likely be called shortly for hydroelectric system.

TORONTO, ONT.—The John V. Gray Construction Co., Ltd., has been awarded the contract for construction of a new power house for the Canadian National Carbon Co., Ltd., Toronto.

TORONTO, ONT.—Contracts have been let by the Hydro-Electric Power Commission of Ontario, covering the installation of a 4000-hp. generator and turbine at the Eugenia development. The installation of this unit will double the present capacity of the plant.

TOTTENHAM, ONT.—Improvements, to cost about $9,000, to the municipal electric-light plant are under consideration.

TRENTON, ONT.—The construction of a transmission line from Halsey Falls to Trenton has been commenced. This line will operate at 44,000 volts and will be of pin-type construction, the conductor being of No. 2/0 copper cable.

WATFORD, ONT.—The constuction work on the hydroelectric line to Watford is now completed.

SWIFT CURRENT, SASK.—By-laws have been passed by the City Council authorizing issues of debentures for $30,000 and $25,000 for improvements for the electric-light and power plant.

Miscellaneous

LIMA, PERU.—It is reported by Commercial Attaché W. F. Montavon at Lima, Peru, that electric locomotives, preferably running on storage batteries, are desired for use on the Cuzco-Santa Ana Railway.

Record of Electrical Patents

Notes on United States Patents issued on August 14, 1917

1,236,404. CONNECTOR FOR ELECTRIC LEADS; Pierre Clerget, Levallois-Perret, France. App. filed Jan. 4, 1917. Consists in forming one-half of the connector with a knob adapted to be engaged through a button-hole-shaped aperture in the other half of the connector in order to make electrical contact with a spring contact contained in said other half.

1,236,448. ELECTRICAL FUSE; Thomas W. Kirkman, New York, N. Y. App. filed June 6, 1916. Improvements.

1,236,480. FACE PLATE FOR ELECTRICAL WALL RECEPTACLES; Johann G. Peterson, Jersey City, N. J. App. filed Feb. 19, 1917. Improvements.

1,236,485. SAFETY-LIMIT SWITCH; Fred A. Rundle, Harvey, Ill. App. filed Dec. 27, 1915. For cutting off the electric current when the mechanism has reached the safety limit in its path of travel in a given direction.

1,236,521. ELECTRIC SWITCH; Harold E. White, Glen Ridge, N. J. App. filed June 26, 1915. Improvements.

1,236,523. CONTACT POINT; Joseph A. Williams, Cleveland, Ohio. App. filed Aug. 9, 1915. Having a heat-resisting non-oxidizable tip united to a base or carrier in such a way that the contact point is durable, reliable and efficient in action.

1,236,551. SPLICING CLAMP FOR CABLES AND THE LIKE; James F. Dillon, Crown City, Ohio. App. filed Oct. 7, 1915. Adapted to splice the adjoining ends of cables through which an electric current is passed.

1,236,563. EXCESS-VOLTAGE-PROTECTING DEVICE FOR ELECTRIC LINES; Torsten A. F. Holmgren, Trollhattan, and Karl A. Lindstrom, Stocksund, Sweden. App. filed Feb. 17, 1914. Consists of a conducting wire mounted adjacent to (above, beneath or at the side of) the wires or wire strands forming the electrical lines proper.

1,236,584. LIGHTNING ARRESTER; Ray H. Manson, Rochester, N. Y. App. filed Nov. 27, 1916. Telephone.

1,236,592. ELECTRIC SIGN; Abraham Morgan, Independence, Mo. App. filed Jan. 18, 1917. Wording or characters of the sign to be conveniently changed from time to time.

1,236,595. PROTECTIVE SYSTEM FOR ELECTRICAL TRANSMISSION LINES; Lloyd C. Nicholson, Buffalo, N. Y. App. filed March 29, 1911. For extinguishing arcs on high-tension alternating-current transmission lines.

1,236,642. ELECTRIC HEATING DEVICE; Theodore Abtmeyer, Wilkinsburg, and Frank Thornton, Jr., Pittsburgh, Pa. App. filed April 6, 1915. For use in connection with certain types of coffee-percolating apparatus.

1,236,668. INSULATOR-CLAMPING DEVICE; James M. Brown, Pittsburgh, Pa. App. filed Jan. 4, 1916. Permits the use of an insulator of minimum size to withstand a predetermined shearing strain.

1,236,672. STORAGE-BATTERY GRID AND PLATE AND PROCESS OF MAKING SAME; Rufus N. Chamberlain, Chicago, Ill. App. filed March 14, 1914. Obtains a plate adapted to give an increased capacity for a given weight.

1,236,673. STORAGE BATTERY; Rufus N. Chamberlain, Chicago, Ill. App. filed March 27, 1916. Provides means for discharging or conveying a cool gas, such as air, into the lower part of the electrolyte of the battery.

1,236,674. CIRCUIT INTERRUPTER; Lewis W. Chubb, Edgewood Park, Pa. App. filed Dec. 26, 1913. Improvement.

1,236,675. VENTILATING MEANS FOR REACTANCE COILS; Lewis W. Chubb, Edgewood Park, Pa. App. filed May 14, 1915. Means for ventilating reactance coils which are inserted in polyphase circuits to limit to safe values the abnormal current flow therein arising from short circuits and other abnormal conditions.

1,236,716. OSCILLATING PHASE ADVANCER; Gisbert Kapp, Birmingham, England. App. filed Nov. 22, 1915. Employs a dynamo-electric machine wherein either the stator or the rotor winding is inserted in the alternating-current circuit in which it is desired to adjust the power factor, and the remaining winding is excited from a source of direct current.

1,236,726. MOTOR-CONTROL SYSTEM; Walter O. Lum, Wilkinsburg, Pa. App. filed July 24, 1914. May be employed in connection with rolling mills and similar machines.

1,236,754. OUTLET BOX FOR ELECTRIC CONDUCTORS; William I. Patterson, Pittsburgh, Pa. App. filed April 28, 1914. Cover of the box is capable of adjustment with relation to the plane of the floor independently of the box and regardless of whether or not the box is in horizontal alignment with the floor.

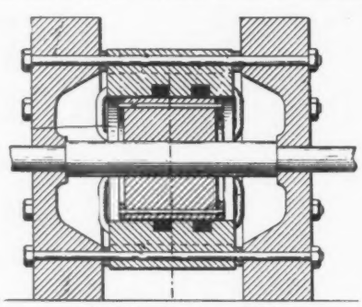
1,236,766. CONNECTOR; Bertrand P. Rowe, Wilkinsburg, Pa. App. filed July 13, 1914. Efficient three-way connector and an inexpensive method of constructing such connectors from metal tubing.

1,236,772. RHEOSTAT; Melvin L. Severy, Arlington Heights, Mass. App. filed Dec. 22, 1914. Comprising a supporting member, a plurality of resistance units carried thereby, each having contacts located in the same curved surface, a shaft supported by said member concentric with said surface, arms rigid with said shaft, a cross-bar carried by said arms, and brushes carried by said bar in touch with said contacts.

1,236,786. ELECTRICAL MEASURING INSTRUMENT; Harold B. Taylor, Wilkinsburg, Pa. App. filed Nov. 6, 1914. Ammeter for direct-current electrical circuits that shall indicate correctly the value of the current traversing the circuit without the necessity of interrupting its continuity.

1,236,790. IGNITING MECHANISM FOR INTERNAL-COMBUSTION ENGINES; Harry R. Van Deventer, Sumter, S. C. App. filed Oct. 1, 1914. Improvements.

1,236,792. X-RAY APPARATUS; Julius B. Wantz, Chicago, Ill. App. filed Feb. 13, 1915. Adapted for use with either the common or ordinary form of X-ray tube, or the recently devised so-called Coolidge



1,237,248—Electric Motor

tube, or other tubes employing a heating element, permitting the operator to use the variety of tube desired.

1,236,796. CURRENT REGULATOR FOR AUTOMOBILE LIGHT CIRCUITS; Albert Wehmeir, St. Louis, Mo. App. filed July 1, 1916. In the form of an inductance coil which serves as an impedance to regulate the current flow in the magneto light circuits of automobiles, particularly of the Ford make.

1,236,809. DIMMER FOR AUTO-HEADLIGHTS; Floyd G. Withrow and John P. Weeks, Grand Rapids, Mich. App. filed Nov. 6, 1916. Structure adapted to be interposed in the usual lighting circuit for attaining this end, it being possible through the structure produced to have the lights at either their full or diminished intensity for any desired length of time.

1,236,886. INSULATOR FOR TELEGRAPH AND TELEPHONE WIRES; Arvid C. Sorensen, Webster, N. D. App. filed Feb. 9, 1917. Wires are permitted to have a certain amount of play.

1,236,916. ELECTRIC REGULATION; John L. Creveling, New York, N. Y. App. filed Oct. 7, 1911. Automatic.

1,236,931. SYMPATHETIC GOVERNOR FOR ELECTRIC POWER DISTRIBUTION; Luther S. Henley, Lebanon, and Frederick R. Keller, Manheim Township, Lancaster County, Pa. App. filed July 3, 1914. So constructed as automatically to cut out a portion or all of the power supplied to a unit of a minor or auxiliary character when the power required by all the units being operated by the system approaches the capacity of the generating unit, so as to avoid the cutting out of a major or main unit and thereby maintain the continuous action or operation of said unit.

1,236,941. ELECTRIC IGNITION APPARATUS; Edward S. Huff, Detroit, Mich. App. filed Nov. 20, 1916. Material will not accumulate upon the contact points of the make-and-break apparatus.

1,236,976. INDICATION-TRANSMITTING APPARATUS; Jacob Perepelkin, Petrograd, Russia. App. filed July 7, 1917. The principal object is that the finder or indicator of a receiver shall not be caused to indicate falsely by reason of casual vibrations or shocks; that is to say, the reading by the indicator at the receiver should be changed only when caused to be so by the operation of the transmitter.

1,236,989. ELECTRICAL MAKE-AND-BREAK DEVICE; Edward T. Shaw, Pittsfield, Mass. App. filed March 30, 1916. For electric ignition systems for internal-combustion engines.

1,237,005. MULTIPLE-FUSE CARRIER; Charles A. Williams, Brooklyn, N. Y. App. filed Dec. 30, 1916. Plurality of fuses may be carried, so that when one fuse burns out another may be quickly and easily brought into position.

1,237,015. ELECTRICAL CONDENSER AND PROCESS OF MAKING SAME; William C. Briton, Jr., Kennett Square, Pa. App. filed March 23, 1916. Improvement.

1,237,033. ARC LAMP; Cromwell A. B. Halvorson, Jr., Lynn, Mass. App. filed Aug. 31, 1915. Improvements.

1,237,080. ELECTRIC MOTOR STARTER; Thomas A. Melville, Fargo, N. D. App. filed Oct. 25, 1916. Combined rheostat and circuit breaker so designed as to incorporate the functions of the circuit breaker and the rheostat in a unitary article.

1,237,105. WARNING SIGNAL; Francis Scognamillo, New York, N. Y. App. filed Oct. 11, 1913. Improvements.

1,237,112. PORTABLE ELECTRIC LIGHT; George A. Soehnlein, Brooklyn, N. Y. App. filed Oct. 5, 1916. Improvements.

1,237,124. ELECTRIC LIGHT REGULATOR; Leonard Sykes, Fort Wayne, Ind. App. filed Nov. 4, 1916. Series of exposed coils and a movable contact adapted to be rocked across the coils to establish electrical connection, therewith vary the resistance to the current passing to the filament of the lamp.

1,237,133. INDICATOR SYSTEM; Earl H. Wildasin, Wilkinsburg, Pa. App. filed Sept. 30, 1916. For use in connection with motor-driven vehicles.

1,237,172. STARTING AND IGNITION MACHINE; Frank Conrad, Pittsburgh, Pa. App. filed Jan. 30, 1914. Improvement.

1,237,181. RECIPROCATING ELECTRIC MOTOR OR ENGINE; Ethan I. Dodds, Central Valley, N. Y. App. filed Jan. 22, 1913. Designed to provide a reciprocating electric motor, which may be used for a variety of purposes, but which is particularly well adapted for operating air pumps or compressors such as those employed upon electrically propelled vehicles for providing the supply of compressed air for the air brakes of the vehicles.

1,237,187. HOLDER FOR INCANDESCENT ELECTRIC LAMPS; George E. Farrar, Perth, Western Australia, Australia. App. filed April 11, 1917. Simple means whereby an incandescent electric lamp holder may be attached to the flexible cords carrying the shrouded flexible wires in an economical and effective manner.

1,237,191. FLASHLIGHT; Richard N. Friend, Sioux City, Iowa. App. filed Dec. 9, 1916. Improved support of cylindrical flashlights.

1,237,211. FUSE; Swan J. Leveen, Rock Island, Ill. App. filed Jan. 7, 1914. Improvements.

1,237,226. INDUCTION-MOTOR SYSTEM; Harry F. Stratton, Cleveland, Ohio. App. filed April 29, 1913. Relates to a controller for alternating-current motors of the induction type, by which controller such a motor may be started by automatically cutting resistance out of the secondary circuit of the motor.

1,237,234. VARIABLE-SIGNAL TRANSMITTER; Clarence E. Beach and Herman W. Doughty, Binghamton, N. Y. App. filed Aug. 7, 1914. Particularly adapted to the type of such transmitters which is provided with operating handles or knobs for use in the formulation of different signals, by adjusting the various handles to the particular digit desired and then initiating the operation of the transmitter by any suitable mechanism.

1,237,240. TIME-LIMIT-CONTROLLING DEVICE FOR ELECTRIC SWITCHES; George A. Burnham, Saugus, Mass. App. filed Dec. 23, 1912. Improvement.

1,237,248. ELECTRIC MOTOR; Allan W. Forbes, Worcester, Mass. App. filed Jan. 18, 1913. Single-phase induction type and means for starting the same.